The RUBBER AGE

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CONSUMPTION OF SCRAP RUBBER MAKES GAIN OF 8 PER CENT IN LAST QUARTER

In Second Quarter of 1925, 79,327,360 Pounds of Scrap Were Used, Making Total Consumption for Half Year 152,000,000 Pounds — Figures Disappointing

Scrap rubber consumption made a record in the second quarter of 1925 when 79,327,360 pounds were used in the three months, April, May and June. This was an eight per cent increase over the first quarter, which in itself was a new record. In the first half of this year the consumption of scrap rubber was 152,000,000 pounds, so that predictions made by the trade that the 1925 consumption of scrap would be over 300,000,000 pounds is more than substantiated by the return for the first half of the year. Compared to the second quarter of 1924, consumption of scrap this last quarter was almost 50 per cent greater.

However, it is not expected that the consumption of scrap in the third and fourth quarters will equal that in the second quarter, inasmuch as the first half of the year is usually the biggest as far as production is concerned and this year has been an exception because production curtailment was delayed so long.

The following is a table of comparisons of scrap consumption compiled by *The Waste Trade Journal:*

Consumption of Scrap by Years

	Pounds
Second quarter, 1925	79,327,360
First quarter, 1925	73,191,200
Fourth quarter, 1924	70,210,560
Third quarter, 1924	50,395,520
Second quarter, 1924	53,251,520
First quarter, 1924	62,814,080
Whole year, 1924	236,671,680
Whole year, 1923	186,046,687
Whole year, 1922	154,211,294
Whole year, 1921	103,194,096
Whole year, 1920	235,446,597
Whole year, 1919	230,985,246

These figures indicate the reclaiming end of the industry has been improving. These figures point to at least a 10 per cent gain in production.

The following table shows how scrap consumption was divided between reclaimers and other manufacturers:

Consumption by Reclaimers and Others

	Reclaimers Pounds	Other Mfrs. Pounds
2d quarter, '25	44,112,320	35,215,040
1st quarter, '25	39,998,880	33,192,320
4th quarter, '24	39,020,800	31,189,760
3d quarter, '24	28,440,280	31,955,240
2d quarter, '24	30,276,480	23,175,040
1st quarter, '24	37,157,120	25,656,960
4th quarter, '23	34,740,000	15,716,000
3d quarter, '23	23,842,000	15,528,000
2d quarter '23	21,859,009	24,995,591
4th quarter, '23	29,618,044	20,072,231

However, in one respect the figures

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NO WIDESPREAD CUT IN AKRON TIRE PRODUCTION

A canvass of the different rubber factories in the Akron district shows that production has been curtailed in some quarters from 5 to 30 per cent under what it was a month ago.

Most of the larger factories, including Goodyear, Goodrich, Firestone, Miller and General, are still running close to capacity, owing to the large quantity of accumulated orders on hand from the midsummer rush.

In view of the slowing up in tire purchases, however, the general opinion is that by the first of October these factories will curtail somewhat. No radical cut in production is expected.

After conditions become more settled and manufacturers have had the opportunity of regulating their stocks and supplying their branches, some of which are now demanding shipments, a probable general reduction of 20 per cent will be noted.

Optimism prevails in all quarters. Dealers' business, both wholesale and retail, is expected to be good and the outlook for manufacturers is better than at any time in the last five years, according to sales executives.

No Change in Tire Prices

No change in the price of tires and tubes is expected before Nov. 1, even if crude rubber prices decline, it is believed by many. The large companies buy their crude rubber more than six months ahead and an immediate change in the market could not affect tire prices for some time. There is a growing belief among Akron manufacturers that the price of crude rubber will drop to more reasonable levels during the coming months. Standardization practices the use of reclaims, and production limitations are already beginning to reduce the consumption of crude rubber.

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CONSUMPTION OF SCRAP MAKES 8 PER CENT GAIN

(Continued from Page 391)

are disappointing. It had been confidently expected that reclaimed rubber consumption would gain enough in favor with rubber manufacturers to replace a large proportion of the crude rubber consumed. It had been hoped that for every pound of crude there would be at least one-half pound of reclaimed used. But the position of reclaimed as compared to crude was evidently no better than during the first quarter when only about one pound of reclaimed for every four pounds of crude rubber was used. Comparison of scrap consumption (one and one-half pounds of scrap usually are used to manufacture one pound of reclaimed) with crude rubber consumption proves this.

AUSTRALIAN IMPORTS OF RUBBER GOODS GROWING

Despite the fact that the domestic rubber industry in Australia is rapidly gaining in importance, and is protected by a high customs tariff and by isolation from other rubber manufacturing countries, statistics compiled by E. G. Holt of the Rubber Division, Department of Commerce, show an increased importation of rubber goods in the fiscal year ended June 30, 1924. The value of such imports was £2,303,630, compared to £1,651,950 in the previous year.

This increased business is applied not only to tires but to practically all other lines. It is due to a general recovery in the Australian market in the 1923-24 period. Rubber tires and tubes constitute over 85 per cent of the total value of imports. Many Australian motorists prefer American and European tires to those of domestic manufacture in spite of the higher price of the imported article. If Australian manufacturers were able to produce tires fully up to the standard of those imported, this condition would not exist. High labor costs nullify part of the advantages of isolation and tariff protection.

Great Britain is a competitor in the cycle-tire trade as much as in the trade in motor tires, it having exported to Australia in 1923, 11,897 automobile casings, 9,482 motor-cycle casings, 27,198 cycle casings, and 48,839 inner tubes of all kinds. France and Italy ship mostly automobile tires to the market, and Michelin and Australian Dunlop tires furnish most of the competition to American makes in the pneumatic-tire field, although Perdriau and Barnet-Glass are also well known Australian makes. In solid tires, British and French made tires offer strong competition to American makes.

Takes Name of Majestic

Due to the confusion resulting from the similarity of its firm name, the Inter-Continental Tire & Rubber Co., Indianapolis, Ind., has changed its name to the Majestic Rubber Co.

This is the name of the former company, whose premises Inter-Continental purchased. Company officials emphasize the fact that there has been no change in the corporation, organization or policies.

Parke Haynes, formerly head of the Inter-Continental, has resigned to engage in business in Florida. C. O. Robinson, of Indianapolis, Ind., is president and Arthur Schlosser is factory manager. F. S. Robinson was recently made general manager and Charles B. Keefer is in charge of sales. Schlosser, who has been identified with the organization for more than two years, was formerly factory manager of the Monarch Rubber Co., Hartville, Ohio.

Coast to Make Balloons

The Coast Tire & Rubber Co., Oakland, Calif., will begin the manufacture of low pressure tires within the next sixty days, it was announced recently by Roy F. Thompson, assistant general manager. At the present time only high pressure cords and tubes are being manufactured. Plans include a three-shift schedule by the first of the year.

Design Process Patented

The New York Belting & Packing Co., New York City, has been assigned U. S. Patent No. 1,552,907, covering a process for forming and applying rubber designs, by the inventor, Thomas V. Binmore. The process comprises forming a film of depolymerized-rubber ink with raised portions, directly applying a backing thereto, and removing said raised portions of the film by stripping the backing.

RUBBER BROKERAGE RATE RAISED TO QUARTER CENT

At a recent meeting of the board of directors of the Rubber Trade Association of New York, a petition of crude rubber brokers for an increase in the brokerage rate was favorably acted upon. It was decided that ¼ cent per pound brokerage should be charged on transactions while quotations remain above 50 cents a pound, the old rate of ⅛ cent to remain effective on transactions below 50 cents a pound.

The brokers said in their petition that ⅛ cent was too low under present conditions and worked a hardship in view of the fact that quotations were to some extent curtailed because of the present high price of crude rubber. The action was passed by an unanimous vote.

Thermoid Issues Report

The annual statement of the Thermoid Rubber Co., Trenton, N. J., for the fiscal year ended February 25, 1925, is as follows:

Assets: Real estate, $389,630; machinery, $1,048,807; merchandise, $938,366; notes receivable, $122,992; accounts receivable, $898,379; cash, $165,955; securities, $38,639; patent rights and trade marks, $105,531; deferred charges, $24,293; total, $3,727,592.

Liabilities: Preferred stock, $150,000; common stock, $1,499,850; accounts payable, $105,599; notes payable, $718,970; reserve for depreciation, $392,143; surplus, $643,809; capital surplus, $217,221; total, $3,727,592.

THE LATEST IN PAJAMAS

Hand painted rubber pajamas are the latest. And who, looking at this picture, would dare say that they are not attractive? Now the ladies can no longer have no excuse for not going into the water.

AUGUST CRUDE RUBBER IMPORTS 31,584 TONS

Recent statistics of the Rubber Association of America show that the August importations of crude rubber were 31,584 tons, an increase of 11,508 tons or over 50 per cent over the August, 1924, importations of 20,076 tons. Plantations totaled 29,921 tons, an increase of 11,524 over last year. Paras aggregated only 598 tons less than last year. Africans were 160 tons, or 407 tons less than August, 1924. Centrals, however, increased from a total of only six tons in August, 1924, to 456 tons this year. Guayule also showed an increase; 92 tons were received last year, whereas 364 tons or an increase of 272 tons were imported this August. No Manicoba and Matto Grosso were received in August, 1924, but this August 85 tons were shipped.

From Singapore, 12,997 tons of plantations were shipped; from Penang, 4,567; from Colombo, 3,441; from Belawan-Deli, 2,145; from Port Swettenham, 2,025; and from Batavia, 1,244 tons, in addition to smaller shipments from other ports. The total importations for the eight months ended Aug. 31 are now 231,467 tons.

Shipments of waste were 388 tons, balata 36 tons and miscellaneous gums, 641 tons. New York received 25,872 tons of plantations; Baltimore, 2,199; Boston, 471; and Philadelphia, 24 tons.

General Assigned Tire

Harold B. Pushee, inventor of a tire recently granted U. S. Patent No. 1,552,-950, has assigned the patent to the General Tire & Rubber Co., Akron. The tire consists in a plurality of plies of cord fabric, the outer ply of fabric extending from bead to bead and being spaced from the balance of the carcass by a layer of rubber of substantial thickness and a tread layer of rubber vulcanized to the carcass. The cords of the outer ply are spaced apart and surrounded by rubber whereby adhesion is maintained between the tread and the carcass. A breaker may be omitted.

Pays Deferred Dividend

In addition to the regular quarterly dividends on the prior preference and preferred stock of the Goodrich Tire & Rubber Co., of Canada, Ltd., for the second quarter of the year, an additional 1¾ per cent was declared to apply on the deferred dividends on the preferred, bringing arrears down to 5½ per cent. Vice-president and general manager C. H. Carlisle issued the following statement to stockholders: "Prices remain exceptionally low in all lines of our products. Both plants are at their maximum production. Our output for nine months of our fiscal year has been the greatest in the history of the company. Our net profits for the nine months exceed those of the same period a year ago."

Do You Want to Go Into the RECLAIMING BUSINESS ?
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Protective Tube Formed

The Protective Tube & Tire Co., St. Louis, Mo., was recently incorporated with an authorized capital of $55,000, of which $45,000 has been paid in, to manufacture tires and tubes. Incorporators and subscribers are A. Koerman, J. M. Steffen, W. M. Rung, A. Enzmann, W. Roemheld, Jr., G. E. Benes, W. Buder, E. O. Switzer, E. H. Gaebler and E. A. Westman.

I. B. KLEINERT RUBBER HOLDS SALES MEETING

The rubber situation and probable prices for the fall and next spring formed the principal subject for discussion at the semi-annual sales convention of the I. B. Kleinert Rubber Co., held recently at the New York offices. Victor Guinzburg, president, opened the meeting with an address in which he declared that no change in the quality of Kleinert's products would be made in spite of the high price of crude rubber. He predicted that manufacturers would pay during the fall and next spring an average price of 300 per cent more than crude rubber cost early this year. Reports of brisk trade came from all the salesmen. The next sales meeting will be held in December.

THE DANGER POINT

Have you been forced to compound down to a point where your stocks are difficult to work and their aging qualities are open to suspicion?

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BRITISH NOT WORRIED BY FIRESTONE'S PLAN

(Special to THE RUBBER AGE*)*

Harvey Firestone's announcement that negotiations for the lease of 1,000,000 acres of land in Liberia for rubber-growing are on the verge of settlement, and that $100,000,000 will be formed to finance the project, has had no effect on the London rubber market and is regarded in Britain generally with indifference.

On Mr. Firestone's figures, the capitalization of these Liberian plantations works out at $100 per acre, which, compared with that of Malayan properties, seems very low. But this pleasant prospect would seem to end at that point, for in the London market it is calculated that the rubber could not be produced under 50 cents per lb. at the least, and the labor problem would be a disconcerting factor.

A small quantity of African rubber is still exported and is dealt in by London brokers. It is landed at Liverpool, but is a very negligible item in the volume of rubber supply. The fate of the big West African rubber launched during the great boom of fifteen yars ago is well remembered in Britain; it found the labor problem in West Africa insurmountable.

Crude Consumption Reported

As a result of a survey just taken, the Department of Commerce is able to announce that 457 American factories using crude rubber report a total consumption of 233,875 long tons of crude rubber during the first seven months of 1925. This consumption was divided as follows:

	PLANTATION Pounds	PARA Pounds	ALL OTHER Pounds	TOTAL Pounds	TOTAL Long Tons
January	66,426,162	2,429,039	1,217,480	70,072,681	31,282.4
February	64,047,275	2,166,149	1,422,566	67,635,990	30,194.6
March	71,220,317	2,493,393	1,437,920	75,151,630	33,549.8
April	72,005,516	2,814,240	1,433,116	76,252,872	34,041.5
May	74,039,744	2,758,088	947,461	77,745,293	34,707.7
June	74,875,374	2,634,097	1,253,471	78,762,942	35,162.0
July	73,544,214	3,254,748	1,459,892	78,258,854	34,937.0
TOTAL (pounds)	496,158,602	18,549,754	9,171,906	523,880,262	
TOTAL (tons)	221,499.3	8,281.1	4,094.6	233,875.0	233,875.0

Companies reporting were asked not to include balata, guayule, gutta percha, gutta siak, gutta jelutong, pontianak or reclaimed rubber.

The factories from which reports were not received are few in number, and it is understood that their use of crude rubber has not been large; the Department accordingly feels that the total consumption announced above is 99 per cent or more complete for the United States for the period stated and that the total American consumption was probably not in excess of 235,000 long tons.

Pinto a Benedict

On Tuesday, September 15, Peter P. Pinto, Business Manager of THE RUBBER AGE, joined the ranks of the benedicts. He was married at the Church of the Esperanza in New York City to Miss Mary M. Conway of Glen Cove, L. I. Following a short reception after the wedding, the new bride and groom endeavored to make their escape but their many friends managed to suitably decorate their car. Upon their return from a honeymoon at Atlantic City, the couple will make their home at 2955 Grand Concourse, Bronx, N. Y. C.

The newlyweds have the best wishes of our entire organization and of Mr. Pinto's numerous friends in the rubber industry.

THE EDITOR

Johnstone Sales Good

The Johnstone Tire & Rubber Co., La Porte, Ind., recently reported that its business has practically doubled that done a year ago and that profits have increased in proportion. The factory has been running since Jan. 1 on a schedule of two ten-hour shifts. The demand for the company's pneumatic bus tires has been particularly good.

Tuscan to Increase Output

According to officials of the Tuscan Tire & Rubber Co., Carrollton, Ohio, tire production will soon be increased to fill fall orders.

Gammeter Granted Patent

U. S. Patent No. 1,553,154, covering a molding method, recently granted John R. Gammeter has been assigned to the B. F. Goodrich Co., Akron. The method comprises making hollow cushion tires by assembling an accurate wire helix with a base to which the tire is to be vulcanized, building the tire over the core on said base and vulcanizing the tire to the base and pulling said wire endwise to uncoil it and withdraw it from the tire. The coiled wire acts as a core.

WILMER EXPECTS POORER HALF FOR RUBBER TRADE

Rubber companies will not have as good a second half as they did in the first half of 1925, in the opinion of E. G. Wilmer, chairman of the board of the Goodyear Tire & Rubber C. The question of further earnings, he believes, depends upon the trend of the crude rubber market. The Goodyear company, he stated, is running at capacity in all plants, and is on three shifts a day at Akron and in California.

"There is no question that there is and has been an actual shortage of crude rubber," Wilmer asserted, "and there will be a gradual transition in the rubber market. It will be a slow and gradual process of building up reserve rubber stocks which will act as a market bumper. If there was a rapid depletion or a rapid accumulation of stocks, it would be dangerous for the market, but gradual accumulation should be very helpful. Our inventories are well under the market. We are running about 35,000 tires a day at Akron, about 6,000 in California and 6,000 in Canada, and our tube production is about 25 per cent in excess of these figures at each place. Our sales are running well ahead of production."

Feinberg Buys Factory

The David Feinberg Co., Chelsea, Mass., scrap rubber dealers, have purchased the plant formerly occupied by Reuter & Co., brewers. The factory comprises the buildings bounded by New Heath and Terrace streets and Parker in the Roxbury section of Boston, alongside the New York, New Haven and Hartford R. R. tracks. Massive buildings of brick construction with 104,000 square feet of floor space will give the Feinberg company an excellent warehouse and office. The firm will move into its new home by Jan. 1, 1926.

To Resell Thomas Plant

The Kelly-Springfield Tire Co., New York City, which some time ago bought the plant and equipment of the defunct Thomas Rubber Co., Wooster, Ohio, for $90,000 reports that it will offer the property for sale. The Thomas company failed some months ago.

Perfection Rubber Chartered

The Perfection Rubber Products Corp., Indianapolis, Ind., was recently incorporated to manufacture various rubber articles. Capital consists of 100 shares of common stock of no par value. Directors are Arthur Langley, Raymond Chandler and John Nantz.

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TIRE PLANTS USE BUREAU OF STANDARD'S MACHINE

The endurance machine for testing tires, which was installed at the Bureau of Standards some time ago, has proved to be of great value to the tire industry aside from its use in testing tires for Government purchases. In addition to the latter tests, at least 15 tire manufacturers have availed themselves of the Bureau's facilities by requesting that tests be conducted on certain tires to determine whether or not they conform to the Government standards.

Two tests of a series of six tires each made for two manufacturers illustrate the points which the tests bring out. In one case it was plainly shown that a weakness existed in the construction of the bead of the tires, and in the other case it was apparent that a change should be made in the methods of manufacture, as the different plies in the tire were not adjusted for equal tension, which caused premature breaking of the carcass. In these particular cases, as well as in many others, manufacturers have stated that the results are of great value to them and have aided them to improve their product by strengthening weaknesses which were shown to exist. One of the big elements in tests of this kind is the speed with which they can be made compared with the time which would be required for road tests. A test can be completed on the machine in about four days which would ordinarily take from six months to a year on the road.

Kent Rubber Opens

The Kent Rubber Products Corp., located in the Kershaw building on Stow St., Kent, Ohio, recently began the manufacture of rubber gloves with an initial production of 40 dozen pairs a day. Officers of the company stated that this production will be doubled in a short time by adding a night shift. The company specializes in the manufacture of rubber gloves of all kinds.

India Earnings High

Earnings of the India Tire & Rubber Co., Akron, show a decided increase; the total for the first six months of 1925 nearly equal the entire earnings of 1924. The statement of the company recently issued shows net earnings of $27 a share of common stock, or an increase of $1 a share over all earnings of last year. Total sales for the first half are reported as $2,314,734, with net profits of $314,655. Sales last year were $3,103,811, with a net of $303,933, or about $26 a share. Common stock paid $6.25 in 1924 and now pays $8.

Rubber Mill Patented

Pirl Ward Hall, Akron, Ohio, was recently granted U. S. Patent No. 1,551,875 on a mill for grinding rubber material. The feature of the invention is a roll having its surface formed with parallel encircling ridges. These ridges have notches cut in the top portion to exert a drawing action of the material.

RUBBER SHORTAGE CAUSES FISK TO CURTAIL OUTPUT

The Fisk Rubber Co., Chicopee Falls, Mass., although flooded with orders for tires and with business never better than it is at the present time, has been obliged to curtail production due to its inability to procure adequate stocks of crude rubber. The Chicopee Falls factory, which is one of five units operated by the company, will be open for the present in most departments only four days a week. A few of the departments will be operated on full time.

Officials were unable to predict recently the probable duration of the part time schedule. If the rubber shortage is not relieved, it may be necessary to prolong the short schedule until Jan. 1.

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DEPARTMENT OF COMMERCE BEGINS THIRD SURVEY OF DEALERS' STOCKS

More than 100,000 Questionnaires will be Mailed to Tire Dealers — Estimates of Average Stocks Range as High as 125 — Surveys Help Manufacturer

Owing to the fact that executives and salesmen of tire companies everywhere are of the opinion that tire dealers' stocks are now the heaviest that they have been in recent years, great interest is being shown in the third semi-annual survey of tire dealers' stocks which the Rubber Division of the Department of Commerce is taking as of Oct. 1, 1925.

Stocks Believed Heavy

Tire dealers have purchased heavily in recent months due to the uncertainty of prices, but the exact extent to which they have been able to pass their purchases on to the motorist is unknown. Estimates of the stocks of the average dealer ranges as high as 125 tires. The average number of tires held by the dealers reporting to the Rubber Division in its survey of Oct. 1, 1924 was only 53.6. The 1925 spring stocks, normally heavier than those of the autumn, averaged 62.2 tires per dealer, as was developed by the Division's second semi-annual survey. Due to the uncertainty which the crude rubber situation has produced, the findings of the third survey should be even more valuable than the others.

More than 100,000 questionnaire forms are now being prepared in Washington for mailing to tire dealers throughout the country. The responses will be carefully examined and the data compiled into totals by States. The data which the Division is asking is brief, covering only the number of pneumatic and solid tires and inner tubes on hand, and the number of makes of tires stocked and a few other questions of less importance. As a basis for computing the number of tires in manufacturers warehouses and branches, the Rubber Division will use the statistics compiled by the Rubber Association of America. When these are considered along with the aggregate figures received from the tire dealers, the American tire industry will have once more a clear picture of its total inventories in the light of which both production and distribution can be intelligently planned.

As has been done in the past, the work of compiling the data submitted by dealers will be rushed just as soon as a fair number of the returned forms have been received. It is believed that a preliminary statement can be issued on Oct. 19 and on about Nov. 1 a complete statement showing the average number of tires per dealer, the approximate number held in the United States and other data will be released. Individual dealer figures will not be published or revealed in any way; the forms submitted by the dealers are regarded as confidential and will be used only as a contribution to the aggregate figures for different states or the entire country.

The data collected in past surveys has been given wide publicity in trade journals and newspapers and called to the particular attention of tire producers with the suggestion that they study it carefully in arranging their schedules. The findings were also made the subject of addresses delivered by Rubber Division officials before tire dealers' conventions. It is known that the data collected in the past has had its effect on both producers and distributors and it is probable that through its October survey, the Department of Commerce can render an even greater service toward the stabilization of the industry.

Majestic Dissolved

The Majestic Tire & Rubber Co., Indianapolis, Ind., recently filed a certificate of dissolution. The company had been in the hands of receivers.

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AND PRINCIPAL FOREIGN CITIES

A Technical Course In

RUBBER MANUFACTURE

By PROF. H. E. SIMMONS, M.S.
Professor of Chemistry in the Municipal University of Akron, Ohio

This course was published serially in THE RUBBER AGE July, 1917, to July, 1918 and is now published in book form.

A valuable book for all in the rubber industry whether factory men, vulcanizers or tire dealers. You can not know too much about how the basic material of the business is handled.

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GOOD MARKET IN JAPAN FOR TIRES AND OTHER AMERICAN RUBBER GOODS

United States Dominates the Tire Market in Spite of the Growing Importance of Domestic Products and High Duties — 37 Plantation Companies in Business

In spite of the growing importance of the Japanese rubber industry and the high customs duties on imported rubber products, there is good reason to believe that the sale of American rubber manufactures will expand as the Japanese market for rubber goods develops, according to a report on the rubber industry and trade of Japan, made public today by the Department of Commerce.

America Supplys Two-Thirds of Tires

American tires and tubes for automobiles, trucks, and motorcycles supply about two-thirds of the market demand in Japan, and encounter little competition from similar articles imported from other countries. They give excellent satisfaction because of their superior wearing qualities, but competition with the domestically produced articles, the pamphlet points out, may be expected to grow more severe in the future.

Japan, one of the few countries producing rubber goods, was early attracted to rubber planting, establishing its first plantation in the Malay Peninsula in 1906. Since then, the report discloses, 37 Japanese concerns have established rubber plantations in the Malay Peninsula, Sumatra, and Borneo, representing a combined investment of $34,771,870. The possible crop which could have been procuced by the Japanese plantations in 1924 is given as 9,240 tons of crude rubber. This crop, however, was not realized on account of the depression in the rubber industry at that time. The years 1924 and 1925 have been far from prosperous years for the rubber-manufacturing industry, many concerns have suspended operations temporarily, and some companies have gone out of business.

$23,470,640 is Value of Rubber Goods

The total value of Japanese rubber goods manufactures in 1923, the pamphlet reveals, amounted to $23,470,640. Of this amount, $2,776,698 worth was exported of which $1,944,125, or 70 per cent, represented rubber tires, principally bicycle and rickshaw tires. Dutch India is the most important consumer of Japanese rubber tires, followed in importance by China, and the Straits Settlements.

The full report is published as Trade Information Bulletin No. 365, "Rubber Industry and Trade of Japan," by C. R. Cameron, American Consul at Tokyo, and takes up in detail the Japanese rubber situation. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., or from any district office of the Bureau of Foreign and Domestic Commerce. The price is 10 cents.

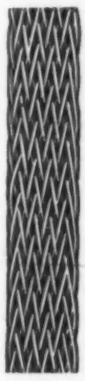
MECHANICAL GOODS DIV. MEETS AT TRENTON CLUB

The Mechanical Rubber Goods Manufacturers' Division of the Rubber Association of America recently held its quarterly meeting in conjunction with the New Jersey Rubber Manufacturers' Association at the Trenton Country Club, Trenton, N. J.

The principal subject discussed was the guarantees on hose and belting. The meeting was held in the morning and after lunch the members played golf. Dinner was served in the evening. J. H. Cobb, of the New York Beting & Packing Co., is chairman of the division.

Monarch at Capacity

The Monarch Rubber Co., Hartville, Ohio, is running at capacity with a daily production of 350 cord tires a day.



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Entire freedom from bead trouble in the construction of straight side tires is assured by the use of either National "(Patent)" High Tensile Strength, Flat Woven, Bead Braid or our new (Pratt Patent) Bead Cables. These cables, made to dimensions specified, have seven strands, yet only one piece of wire is used without soldered, welded or brazed joint.

Write for working samples of either National flat braid or Pratt cables (no charge to tire manufacturers) and full information as to our products and service.

Our engineering department tests beads and furnishes complete confidential reports as to their stretch, set and bursting point, without charge. Inquiries solicited regarding this special service.

National Standard Company
Niles, Michigan

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Prevailing high prices of rubber have forced manufacturers to use more reclaimed stocks. Use Dovan Diphenyl Guanidine as it is the most efficient and economical accelerator on the market.

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J. A. Kendall, Akron, Ohio; J. E. Odell, Boston, Mass.; American Oil & Supply Co., Trenton, N. J.; T. E. O'Reilly, Ltd., Toronto and Montreal; Martin, Foyt & Milne, San Francisco and Los Angeles; Buckleton & Co., Ltd., 13 Rumford St., Liverpool, England.

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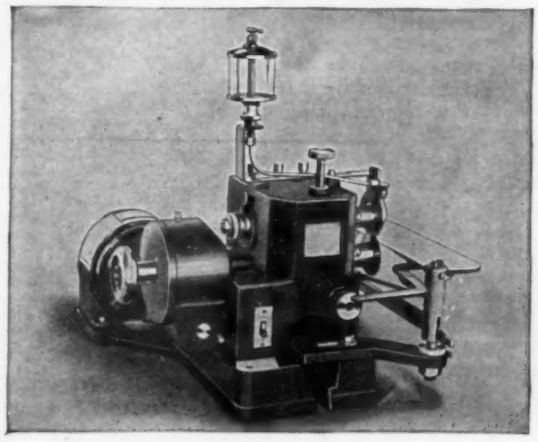

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NORTH BROOKFIELD MASS., U. S. A.

L. C. ROCKHILL SEES HOPE FOR LOWER TIRE AND RUBBER PRICES NEXT YEAR

Seasonal Curtailment of Tire Production and Additional 10 Per Cent Release in November Will Cause Reduction in Consumption of Rubber and Thus Bring Relief

When asked by tire dealers if tire prices are coming down, L. C. Rockhill, sales manager of the Goodyear Tire & Rubber Co., Akron, replies that tire prices have never gone up in proportion to the Spectacular rise in the price of crude rubber and present tire prices are based on rubber values considerably under the present market value.

In the month of August 1924 the highest quotation on immediate delivery rubber was 27¼ cents, Mr. Rockhill points out. From this point rubber rose slowly but more or less steadily until in April 1925 it reached a high point of 45¾ cents.

The larger tire manufacturers always have rubber bought ahead for several months and during the early part of 1925 they resisted any price advances on tires and gave the public the benefit of previous rubber purchases at lower prices than the early 1925 levels.

Advanced Tire Prices Were Necessary

With rubber steadily advancing, however, the average cost to the manufacturer of tires was increasing and when rubber had gone from 27 cents to 45 cents tire prices were necessarily advanced in May. The month of May usually marks the beginning of the active tire buying season and with rubber consumption increasing and the world's surplus diminishing, it is not surprising that rapid advances in crude rubber prices occurred.

In May rubber reached a high point of 69½ cents. In June the high point was 89⅜ cents. By July it reached $1.21 which is the highest price quoted for years.

The price of $1.21, however, had little or nothing to do with present tire prices as practically no rubber was bought at this price by the important tire manufacturers.

In other words, the $1.21 figure was largely fictitious as far as the cost of tires is concerned because practically no rubber at this price has entered into the production of tires.

If it had, tire prices would be a lot higher than they are now. With a high point of $1.21 and a low point of 81⅛ cents in July there was a slight reaction in August, the high price being 95½ cents and the low price being 71¾ cents.

Seventy-one cents seems like a big drop from $1.21 and it is this decline that has caused people to wonder how soon a reduction in tire prices will occur. The fact is, however, that present tire prices are based on rubber bought at less than 71 cents and lower than spot rubber has been quoted since May.

This is easy to understand when one realizes that tire prices prior to May were established in October 1924 and were based on rubber at about 27 cents. The lowest price at which rubber has been available since June is 71 cents which is an increase of 163 per cent over the rubber cost on which tire prices were based prior to May.

Advance Only 35 Per Cent

In the meantime tire prices have been increased only about 35 per cent. It is plainly evident, then, that the public is still getting the benefit of lower priced rubber purchased before the recent sharp advances and there is no likelihood of a reduction from present tire price levels unless rubber should decline materially.

As a matter of fact, however, after a brief reaction early in August when spot rubber reached the low point of 71 cents, it immediately started to advance again and at the time of this writing is quoted at 87 cents.

If a price of even 71 cents were maintained permanently, tire prices would have to be advanced again after present stocks of lower priced rubber were exhausted.

But in any event, with rubber at 87 cents as at present, there seems to be no possibility of any early decline in tire prices.

Quotations for Last 12 Months

The following table shows the high and low spot rubber quotation for the past 12 months:

	PRICE PER POUND	
	HIGH	LOW
August 1924	$0.27¼	$0.23⅜
September	0.28⅜	0.26½
October	0.32⅜	0.28⅞
November	0.35⅛	0.34
December	0.40⅛	0.35½
January 1925	0.39⅞	0.34⅝
February	0.38⅝	0.34⅝
March	0.44⅛	0.38⅛
April	0.45¾	0.41¼
May	0.69½	0.45
June	0.89⅜	0.69½
July	1.21	0.81⅛
August	0.95½	0.71¾

There is very little hope for lower tire prices in 1925. The seasonal decline in tire business this winter with the resulting reduction in production of tires will naturally cause a marked reduction in rubber consumption, especially since tire manufacturers have decided against any future dating this fall so that artificial stimulation to production and inventories will be withdrawn.

With a reduction in production and inventories, plus an additional release of 10 per cent more rubber in November under the Stephenson act, there is some hope for lower rubber and tire prices in 1926, but this relief will not come soon enough to have any effect for some months to come.

It must be remembered that from the time rubber is purchased in the far east it takes about three months to get it into the American tire manufacturer's plant so that rubber released in November will not be available for tire production until January or February.

Stocks Reach New Low Record

London rubber stocks have decreased by yet another thousand tons, and now stand at the insignificant figure of 4,000 tons. From the present position of the commodity market, it would appear that producers are justified in expecting a satisfactory margin of profit for some months ahead. How long the situation may last depends on the maintenance of increased consumption, for, apart from the automatic additional releases under the restriction scheme, the influence of the high level of prices naturally stimulates output from non-British producers.

Vulcanizing Process Patented

Sidney M. Caldwell, inventor of a process for vulcanizing rubber and similar materials recently granted U. S. Patent No. 1,552,820, has assigned the patent to the Naugatuck Chemical Co., Naugatuck, Conn. The process consists in combining rubber with sulphur, lead dithiobenzoate and an oxide of lead, and vulcanizing the mix.

SOLID FIBRE
SHIPPING CASES
The MODERN and SATISFACTORY method for PACKING and SHIPPING.
Shipments can be made in units up to 90 lbs.
INEXPENSIVE STRONG
SPACE SAVING
PILFER PROOF
WATER PROOF DURABLE
We operate a department for SMALL, RUSH & SPECIAL ORDERS
Send in your inquiries. We shall be pleased to submit samples and quote prices.

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Firestone Assigned Patent

Robert R. Jones, inventor of a device for curing inner-tube splices, has assigned U. S. Patent No. 1,551,669, covering the device, to the Firestone Tire & Rubber Co., Akron. The apparatus comprises a hollow mandrel and connections for conducting a heated fluid into and draining it from the mandrel. The connections include an adapter connected to supply and drain pipes formed with passages having large outlets. The mandrel has corresponding but smaller inlet passages. A flange formed on the adapter and a corresponding flange formed on the mandrel are bolted together.

E. W. Boughton Promoted

The New Jersey Zinc Sales Co. announced recently that W. Homer Hendricks, since 1916 general sales engineer with headquarters at New York, had been transferred to the operating department of the company.

Mr. Hendricks is succeeded as general sales engineer by Everett W. Boughton who since 1922 has been connected with the Sales Engineering Department.

Mr. Boughton was born in Brooklyn, N. Y. and educated at the Polytechnic Preparatory School and the Polytechnic Institute of that city. He received his B.S. degree in 1903. In 1909 George Washington University conferred on him the degree of M.S.

After finishing his college course, Mr. Boughton was instructor in chemistry at Brooklyn Polytechnic and from 1904 to 1907 was a chemist in the U. S. Bureau of Chemistry. In 1907 Mr. Boughton became associated with the U. S. Bureau of Standards where he remained until 1915 when he became chief chemist of the Congoleum Company, which position he held until the outbreak of the war. During 1917-1919 Mr. Boughton served in

Everett W. Boughton

France as Lieutenant, U. S. Army.

After demobilization he became technical supervisor of the Everett Works of E. I. du Pont de Nemours & Co., which position he held until joining the forces of The New Jersey Zinc Co.

Mr. Boughton lives in Westfield, N. J., with his wife and four year old son, James H. He is a member of the Phi Kappa Psi fraternity.

Europe's Consumption Grows

The extent to which the buying of crude rubber by European countries has been resumed is brought out sharply by a comparison of the quantities and values of the exports from London to the principal consumers during the first seven months of the year. They are as follows:—

	1924 Tons	1925 Tons	1924 £	1925 £
Russia	400	5,024	50,361	917,542
Germany	4,351	6,054	559,609	1,097,435
France	10,454	9,707	1,229,554	2,043,655
Italy	2,817	2,886	325,556	534,210
U. S. A.	16,656	26,633	2,095,605	5,367,074

Over the period the complete total shows an increase in shipments from 39,836 tons to 55,423 tons, the corresponding values having increased from £4,919,218 ($24,596,390) to £10,957,577 ($54,787,885). Comparison, it must be remembered, is with a period of 1924 during which the spot price of the commodity fell to 9d. (18 cents) per lb., while little more than a month ago the shortage of immediately available supplies had raised the quotation to 4s. 6d. ($1.10) per lb.—the highest point attained for years past.

"Valclar" Registered

The Kase-Quinby Rubber Co., New York City, recently registered the trade-mark "Valclar" in the U. S. Patent Office under Ser. No. 212,441. The company has used the trade-mark on rubber and rubberized aprons and sanitary baby pants since last March.

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FORMIC ACID REPLACING ACETIC IN COAGULATION

Formic acid is replacing acetic acid in Sumatra for the coagulation of rubber latex, owing to the high price of the latter, says a recent report of the Department of Commerce. A Dutch firm has been conducting an active compaign in favor of formic acid for this purpose. The price early in June was 60 florins per 100 kilos c.i.f. Belawan, Sumatra, against 70 florins per 100 kilos for acetic acid.

Acetic acid consumed in British Malaya for the same purpose has also increased sharply in value since 1921, although the restriction of rubber production has had a marked effect during 1923 and 1924. In 1921 Canada furnished 50 per cent of the total, but is no longer an active competitor. Japan was a factor in 1922 but at present the market is in the possession of Europe, principally Germany and Belgium. Consumers are said to have no preference as to the country of origin but are interested only in quality and price. The average price is £60 per ton. A plant is to be erected in British Malaya for recovery of acetic acid from the waste wood of the jungle.

Total imports in 1924 were 1,385 tons, against 1,537 tons in 1923. Of this amount the United States supplied only 53 tons in 1924, against 13 tons from the United Kingdom, 8 tons from British possessions, and 1,311 tons from Europe.

Firestone Wins Cattle Prizes

Harvey S. Firestone, president of the Firestone Tire & Rubber Co., Akron, won four prizes in the cattle show recently held at the Ohio State Fair. He is expected to win other prizes in later showings of his cattle at the same fair.

Tire Machine Patented

William B. Harsel, inventor of a tire-building machine recently granted U. S. Patent No. 1,552,987, has assigned the patent to the Goodyear Tire & Rubber Co. The machine, which is designed for building a number of tires at the same time, includes in combination, a plurality of tire-forming cores, a core-conveyor, a series of fabric-supplying units disposed longitudinally of the straightway path of travel of the conveyor, and a series of fabric-stitching units similarly disposed. There is one stitching unit for each supplying-unit. A bead-setting unit is also similarly disposed. Means are provided both for mounting the cores independently of the conveyor and in operative association with the units and for operating the conveyor to effect its movement in a rectilinear course, and, thus, effect the positioning of tire-forming cores in relation to the different units.

Frank D. Waterman Wins Nomination for Mayor

Frank D. Waterman, president of L. E. Waterman Co., manufacturers of fountain pens, was nominated for Mayor of New York on the Republican ticket at the recent primaries. If he is elected, the rubber industry will have a representative in City Hall. Mr. Waterman is the first 100 per cent business man candidate for Mayor in the history of the city.

McGraw to Resume Operations

Operations are to be resumed at the factory of the McGraw Tire & Rubber Co., East Palestine, Ohio, as soon as business men have completed negotiations for financing its reopening, it was stated recently. The factory, which has been idle for several years, gave employment when operating to hundreds.

Middle-West Organized

The Middle-West Rubber Corp., Detroit, Mich., was recently incorporated with an authorized capital of $50,000 to buy and sell new and used rubber products. Incorporators are Mollie Feinstein, 2463 Beaubein Ave., Anna Mamlin and William Mamlin, Detroit.

Hood Declares Dividend

The Hood Rubber Co., Watertown, Mass., recently declared the regular quarterly dividend of $1 on common stock. The dividend is payable Sept. 30 to stockholders of record Sept. 19.

WEST AFRICAN RUBBER PROSPECTS BRIGHTER

Although failure has attended the majority of rubber-growing schemes initiated in West Africa, planters are again showing interest in that territory as a result of Harvey Firestone's plan to float a $100,000,000 corporation to finance rubber plantations in Liberia.

One British undertaking which regards the outlook optimistically is the African & Eastern Trade Corporation. It has two rubber plantations in Nigeria, comprising an area of 2,700 acres, of which 2,480 acres are under cultivation. The output is estimated 540,000 lb. for 1925, and will steadily increase year by year until the whole area comes into full bearing.

"We are now satisfied that plantation rubber can be produced in West Africa at a cost to compare favorably with that of other countries," said J. H. Batty, chairman of the corporation, at its recent annual meeting in Liverpool. "The quantity now obtainable is sufficient to give a good return on the capital outlay, even if the market price should return to normal. We have been much encouraged in continuing these plantations, even in years when the market price of rubber was below cost, owing to the good reports on the quality, and we anticipate establishing a ready market for our brands.

"We are now running a monthly steamship service between West Africa and England. A new steamship, the Nigerian, has just been launched, and is expected to commence her maiden voyage in October. This vessel has been specially built for the trade and is fitted with the latest appliances."

Triangle at Capacity

The factory of the Triangle Tire & Rubber Co., Canton, Ohio, continues to turn out approximately 350 tires a day, despite the fact that a number of the smaller factories in the Canton district are curtailing production. No tubes are manufactured. "Outlook for fall is unusually good and inquiries have been frequent," said M. C. Wyatt, general manager. "We believe sales will hold up well for the remainder of the year."

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Use More Zinc Oxide
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Boston
Trenton
Montreal
Chicago
Louisville
San Francisco
Los Angeles
New Orleans

SOUTH AMERICA USES MOST AMERICAN TIRES

South America, which has taken more American tire exports than any other Continent, received 224,457 tires out of a total of 930,449 exported from the United States in the first half of 1925, but may take even a greater percentage in the second half of the year, say Miller tire officials who have made a study of the South American market. This is expected because South America, lying below the equator, is entering its Summer weather while this Country is leaving the touring season behind and approaching Winter. Because the Summer is approaching there more tires will be needed.

Argentina led the world in importing American made tires, her imports during the first half of 1925 amounting to 99,211 tires and 119,224 tubes. Her imports of tires compared with her total automotive imports were relatively larger than many other countries. Brazil, another South American country, was third in the number of American made tires, having received 70,880 tires from the United States and 53,913 tubes. Denmark was fourth with 56,186 tires and 64,602 tubes. Australia, a British continent, received 51,034 American built tires and 36,320 tubes. Japan imported 39,450 tires and 22,878 tubes. New Zealand bought 28,633 tires and 14,451 tubes.

Toy Balloon Patented

John Ferretti, Hastings, Pa., was recently granted U. S. Patent No. 1,551,986 on a toy balloon. The patent covers the combination with an inflatable balloon a small inner balloon arranged within the other and having a thin, flexible wall. It is adapted to engage and conform to the walls of the outer balloon about the inflating neck to seal the outlet of the outer balloon and prevent the escape of gas.

New British Goods Marketed

A new sterilizable waterproof sheeting recently placed upon the market in England is attracting considerable attention in the hospital and medical world. It can be repeatedly sterilized without deteriorating. It is extra large in width (40 inches), it does not crack or crease when folded, is odorless, resists urine, and does not deteriorate in stock.

A hot-water bottle which is burst-proof and leak proof is another new rubber article in England. These qualities are apparently secured by a stout lining of tested cloth under the rubber so that if the latter is punctured it cannot split as it would do without this protection. In addition, the seams are sewed together as well as vulcanized. The manufacturers evidently thoroughly believe in the qualities of this bottle, as a three years' guarantee is attached to every one as a protection to the retailer and the user.

Salem Building Additions

Increased production is reported at the factory of the Salem Cord Tire Co., Salem, Ohio, where additions are now in course of construction and machinery from the recently-acquired Niles plant is being installed.

INFORMATION EXCHANGE

The inquiries listed below have already been answered but additional information from our readers will be welcome. Mention the reference number in correspondence.

Latex Paper

(Reference No. 165) Sometime ago you published an article on latex paper. Will you kindly let us know who manufactures this as we would like to see some samples of 40 and 50 lb. papers?

* * *

Liquid Latex

(Reference No. 166) I would like to buy some liquid latex. Will you let me know where I can procure this commodity?

* * *

Thin Rubber Strips for Vineyards

(Reference No. 167) A reader desires quotations on about 22,000 lb. (10,000 kilograms) of thin strips of sheet rubber about 4¾ inches long and 3/16th of an inch wide for use in vineyards. Shipments are to be made to Trieste, Italy, in boxes of one kilogram each, packed together in cases of 50. The Editor of THE RUBBER AGE has a few sample strips which he will send to those manufacturers interested.

NEW YORK RUBBER ASSETS BRING $95,000 AT SALE

The resale of the assets of the New York Rubber Co., Beacon, N. Y., was recently held at the factory under the direction of George H. Gage, sitting as special master, assisted by George W. Retz and James G. Meyers, equity receivers who have been conducting the business since August, 1923. The entire property, including the factory, water rights, etc., was at first offered free and clear of all taxes. The highest bid was made by Kern Dodge of Philadelphia, who offered $92,000. The property was then offered subject to taxes and liens—of $26,500, and the Tucker Rubber Co., Buffalo, bid $50,100.

When assets were offered in parcels W. J. Tompkins, of Mount Vernon, N. Y., bid $31,500 for the real estate and water rights, together with taxes of $5,000. The Tucker Rubber Co. bid $3,500 for the merchandise alone and also submitted a bid of $60,000 for the machinery. It is understood, however, that Mr. Tompkins was acting for the Tucker Rubber Co.

The equity receivers will receive approximately $95,000 for the property.

Federal Judge Bondy confirmed the sale on Sept. 15. Applications of the Philip McGrory Co. and the L. Albert Co. for a new sale were denied on the ground that, although their latest bids exceed the bid of the Tucker Rubber Co., the increase would not be enough to meet creditors' claims amounting to $200,000.

Allegheny Rubber Formed

The Allegheny Rubber Co., Harrisburg, Pa., was recently incorporated with an authorized capital of $5,000 to deal in rubber products. Incorporators are William Kaufman, A. C. Hileman and G. R. Dapper.

N.T.D.A Elects Directors

A. L. Glick of Pittsburgh and A. P. Woehrle of St. Louis were recently elected directors of the National Tire Dealers Association to fill the places left vacant by the resignation of C. D. Manville and H. L. Alden. The two new members of the board will serve until November.

Est. 1900 Inc. 1919

THE KUHLKE MACHINE CO.

Formerly Jones & Kuhlke

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GENERAL MACHINE WORK

Akron, Ohio

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Canada . .	Two-Fifty
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PROGRAM FOR SAFETY CONGRESS ANNOUNCED

The National Safety Council recently announced the program for the Fourteenth Annual Safety Congress which is to be held at the Hotels Statler, Winton and Cleveland in Cleveland from Sept. 28 to Oct. 2. In addition to its own session, the Rubber Section will hold a joint meeting with the Chemical Section on Tuesday, Sept. 29 at 10 a. m. in the Hotel Statler at which the report of the committee on benzol poisoning will be presented by Prof. C. A. Winslow, chairman of the committee. Addresses will be delivered by Dr. E. R. Hayhurst on "The Use of Carbon Tetrachloride vs. Carbon Disulphide in Industry"; and Brigadier-General Amos A. Fries on "What the Chemical Industry of the Country Means to the Chemical Warfare Service."

A meeting of the Rubber Section, of which E. L. Hewitt is chairman and H. H. Graef, vice chairman and secretary, will be held Wednesday Sept. 30 in the Hotel Statler. The report of the chairman, the appointment of a nominating committee, the report of the secretary and reports of committee will open the first session. A round table discussion on "Safety Kinks—Old and New" will be led by R. C. Salisbury, of the Fisk Rubber Co., Cudahy, Wis.; E. W. Beck, of the U. S. Rubber Co., N. Y.; and H. T. Martin, of the Fisk Rubber Co., Chicopee Falls, Mass. The election of officers will then take place.

At the second session on Oct. 1 at 10 a. m. in the Hotel Statler an address will be delivered by William H. Larkin, Jr., power engineer of the mechanical goods factories, U. S. Rubber Co. on "Power Windups," E. A. Hoener, chief engineer, Firestone Tire & Rubber Co., chairman of the engineering committee, will make his report and reports will be also made for the health hazards and statistics committees respectively by C. F. Horan, Hood Rubber Co., Watertown, Mass. and S. Mansfield, Goodyear Tire & Rubber Co.

Lambert Gets Cushion Tire

Carl E. Rett, inventor of a cushion tire which was recently granted U. S. Patent No. 1,552,081, has assigned the patent to the Lambert Tire & Rubber Co., Barberton, Ohio. The tire has conical recesses extending inwardly from opposite sides in staggered relation with their axes spaced apart a distance less than the greatest diameter of the recesses. The recesses extend substantially three-quarters of the way through the tire.

Anchor Rubber Formed

The Anchor Rubber Co., Inc., Cambridge, Mass., was recently incorporated to manufacture raincoats. Authorized capital is $10,000. Officers are Max Margulis, president; Joseph Margulis, vice-president and treasurer; and Fred Freedman, secretary.

De Mattia Adds Extension

De Mattia Brothers, Inc., Garfield, N. J., manufacturers of core chucks, special machinery, tire molds and molds for mechanical rubber goods, are adding an extension to their foundry in Clifton. The addition will nearly double the capacity of the plant and will provide more space for the chuck machine shop which is located at this plant. The company is also installing a through craneway over the yard and is putting in modern storage bins to improve the side track facilities.

RIMS APPROVED BY TIRE AND RIM ASSOCIATION

Size	Aug. 1925 Number	Pct.	Aug. 1924 Number	Pct.
Clin.				
24x3	....	..	....	..
26x3	4,400	0.3	5,334	0.3
28x3	....	..	....	..
30x3	....	..	45,952	2.6
30x3½	260,556	14.6	794,831	44.8
31x4	33,599	2.4	51,563	2.9
S.S.				
25x3½	460	0.0	....	..
27x3½	18	0.0	....	..
28x3½	466,527	26.0	81,033	4.6
29x3½	....	..	....	..
30x3½	34,196	1.9	168,878	9.5
32x3½	511	0.0	4,310	0.5
28x4	337,795	19.0	82,043	4.8
29x4	137,775	7.7	76,505	4.3
30x4	2,653	0.1	47,718	2.7
31x4	122	0.0	1,046	0.1
32x4	34,284	1.9	87,520	4.9
33x4	2,072	0.1	5,313	0.3
34x4	....	..	738	0.0
29x4½	52,867	3.0	35,168	2.0
30x4½	191,434	10.6	74,091	4.2
31x4½	4,677	0.3	27,280	1.5
32x4½	31,215	1.8	96,128	5.4
33x4½	....	..	675	0.0
34x4½	5,910	0.3	7,466	0.4
36x4½	154	0.0	250	0.0
30x5	21,482	1.2	29,036	1.6
31x5	48,315	2.7	37,564	2.1
33x6	14,326	0.8	574	0.0
Truck				
30x5	59,618	3.3	(See Note)	
34x5	7,339	0.4	5,554	0.3
32x6	15,676	0.9	3,772	0.2
36x6	8,257	0.5	3,158	0.2
34x7	3,714	0.2	260	0.0
38x7	....	..	....	..
36x8	703	0.0	....	..
40x8	5	0.0	....	..
40x10	2	0.0	....	..
44x10	119	0.0	....	..
TOTAL	1,781,401		1,773,190	

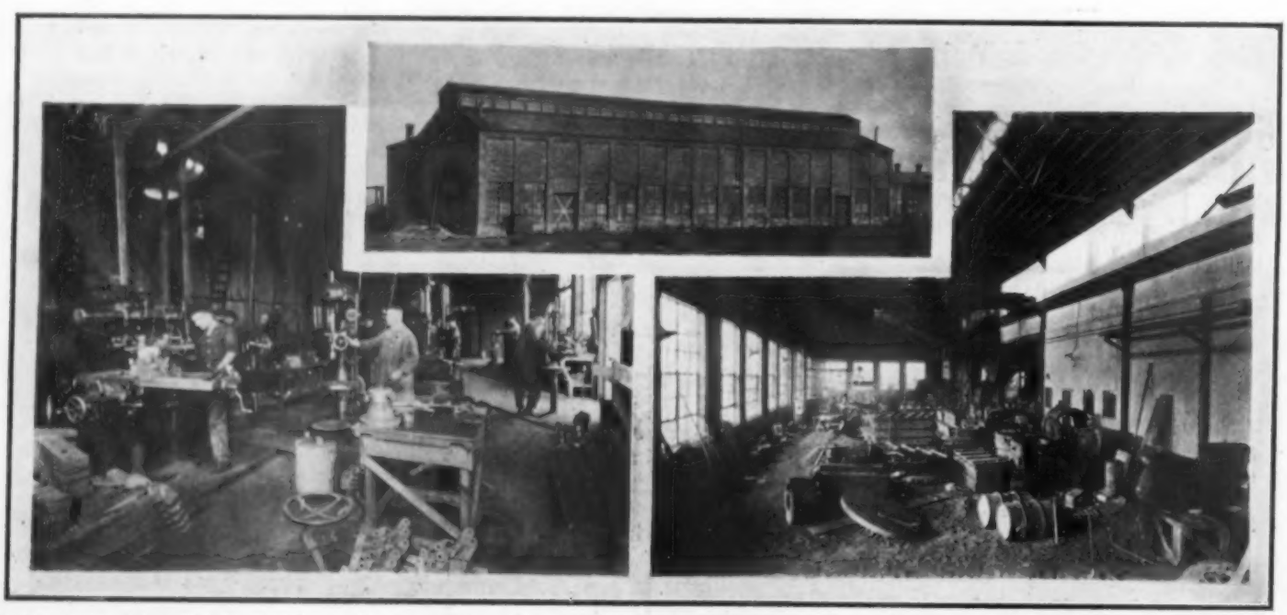
Exper. 27x4½—1,272

Motorcycle	0.3	Motorcycle	0.3
Clincher	17.0	Clincher	50.3
Balloon	71.4	Balloon	26.5
Regular S.S.	6.0	Regular S.S.	22.2
Truck 20″	4.4	Truck 20″	0.2
Truck 24″	0.9	Truck 24″	0.5

NOTE: 30x5 rims not divided in 1924.

Scrap Dealers Chartered

Kaplan & Levendorf, Chelsea, Mass., was recently incorporated with an authorized capital of $25,000. The firm will deal in scrap rubber.



(Top) De Mattia Foundry, Located on Main Line, Erie R. R., Clifton, N. J. (Left) Interior of Chuck Machine Shop. (Right) Interior of Foundry.

PRICES WILL AFFECT BRAZILIAN SITUATION

(Special to THE RUBBER AGE*)*

The British Consul at Para, Brazil, has prepared a survey of the Brazilian rubber situation as affected by the rise in prices. He states that, while prevailing conditions have not yet had time to affect Brazilian production materially, there is no doubt that a substantial increase will take place and that the flight of labor from agriculture to rubber has already commenced.

Taking a maximum output of 41,950 tons, which was the production for 1912-13, it is shown that in 1920-21, when the Brazilian rubber position was at its worst, production had fallen by 50 per cent—viz., to 20,875 tons. The output for the season 1924-25 is estimated at 24,500 tons, while experienced opinion places the 1925-26 crop at about 30,000 tons. How far the recovery in the industry might eventually proceed depends upon a number of factors, including the future course of prices, labor facilities, and the condition of old areas, but, with an indicated world consumption for the current year of about 550,000 tons, the importance of the Brazilian output as regards supply must remain relatively small.

Harry Zahn Buys Trent

Harry Zahn, New York rubber manufacturer, bid $146,100 for the plant and equipment of the Trent Rubber Co., Enterprise Ave., Trenton, N. J., at the receivership sale of the bankrupt company, held Sept. 12. The bid was accepted by Charles F. McCoy, receiver for the rubber concern, and the sale will be reported in the Federal District Court Monday, September 21, for confirmation.

The sale was made subject to encumbrances, which are estimated at $146,000.

Announcement was made by the new purchaser that operations will be resumed at the plant in the near future, the production to consist for the most part of automobile tires and tubes. The Trent Rubber Co. was twice in the hands of a receiver. Financial difficulties necessitated the appointment of a receiver four years ago, but the company was reorganized and was successfully operated for a time. On the occasion of its second failure, Mr. McCoy was named receiver.

Which is Hotter— Rubber or Leather?

In a recent issue of the Salem, Mass., *News* there appears an interesting comment on the bulletin issued by the Bureau of Standards on the heat retaining properties of rubber and leather. The comment is reproduced for the information of our readers:

TANNERS DOUBT THE BUREAU

Tanners are scratching their heads and are wondering if the U. S. Bureau of Standards is just having a bit of fun with them, or if it really means what it says. The bureau has just issued a bulletin entitled "Thermal conductivity of leather and of rubber." The bulletin says that the "Thermal conductivity" of leather and rubber are the same. This means that rubber shoes are no hotter than leather shoes on the feet.

This is an amazing statement, but the bureau offers to prove it as a fact. Indeed, it says in its bulletin that it has conducted a series of tests which prove that rubber is no hotter on the feet than is leather. It has put shoes of rubber and shoes of leather on hot plates and has stuck thermometers inside them, and has read the temperature of the thermometers and has found them to be the same. It has also used thermocouples to compare the relative temperatures and has taken note of the electric input, which is Greek to tanners.

But all that Peabody tanners want is to have an agent of the Bureau of Standards, wearing rubber boots, take the place of the traffic officer in Peabody Square on a summer day, not a hot summer day, but just an ordinary summer day. If he does not wilt before the day is done, and climb out of those rubber boots and go barefooted for a while then the tanners will admit the Bureau of Standards is right in its statement as set forth in its bulletin, that rubber is no hotter than leather.

The case, of course, is subject to review by the congress of sole cutters.

Rubber Shoe Patented

Arthur A. Willson, Chicago, Ill., was recently granted U. S. Patent No. 1,552,-022 on a rubber shoe having a series of continuous concentric grooves arranged on the bottom in which are placed wear strips of a material more resistant to wear than the rubber sole.

FACTORIES TO ABANDON SPRING DATING POLICY

Leading automobile tire manufacturers have generaly decided to practically eliminate the spring dating policy, whereby shipments are made to dealers in the late fall and winter, with the agreement that they will not have to be paid for until five or six months later.

This has served in the past to stimulate production during the dull season in the late fall and winter. Abuse of the policy by some manufacturers overloaded dealers and often led to price cutting.

The Rubber Association of America recommended that spring dating be abandoned as a means of conserving depleted stocks of crude rubber. By cutting down consumption in the next few months, it is hoped to build up a reserve of rubber which will relieve the present shortage. Under the new policy rubber will be made up into tires designed for immediate sale to the consumer. Piling up of large stocks of tires at this time, it is pointed out, would require nearly all the visible supply of rubber, and when production started at full capacity in the spring there would be a greater shortage than ever.

Although there was a decided falling off in sales during August, as a result of unusually heavy buying in June and July, the manufacturers report better business in September. The "overbought" situation apparently has corrected itself and the tire business is proceding on a more even keel.

Patents Pneumatic Tire

Ivan Andre, Deland, Fla., was recently granted U. S. Patent No. 1,552,106 on a pneumatic tire. The tire consists of a plurality of removable independent resilient pneumatic sections interlocking with each other which are arranged within the casing and are removable. A removable tube within the casing supports these sections.

Seiberling to Build Addition

The Seiberling Rubber Co., Akron, will soon begin the erection of an addition to its factory. The extension will comprise a one-story structure, 150 x 240 feet, to be equipped for curing, stripping and finishing operations. Estimated cost is $200,000, with machinery.

The CARTER BELL MFG CO

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COMPLETE PROGRAM FOR CHEMICAL SHOW ISSUED

The program of meetings, speakers, motion pictures and other events to be held in conjunction with the 1925 Chemical Exposition during the week of Sept. 28 to Oct. 3 at the Grand Central Palace, New York, has been completed with the exception of a few last-minute revisions.

Of interest to rubber manufacturers will be the new products developed within recent years which are to be shown on the third floor of the exposition. These include: New Jersey Zinc Co.—Germanium Dioxide, extremely high purity cadmium, extremely high purity zinc; E. I. DuPont de Nemours & Co.—Vulconex and Ditolylguanidine, two rubber accelerators; United States Rubber Co.—Sprayed Rubber.

At one of the sessions for chemical students, Norman Madge will deliver a lecture on "Rubber as a Material of Construction."

A RUBBER BOAT

In England a collapsible and unsinkable toy boat made of canvas and rubber has been perfected. It is inflated with air by means of a small pump.

Ball Process Patented

Ralph E. Riley was recently granted U. S. Patent No. 1,551,847 on a process and apparatus for making hollow elastic rubber balls. The patent has been assigned to the Miller Rubber Co., Akron. The method consists in printing an ornamental design upon a piece of thin uncured sheet rubber and then attaching the sheet to the tacky surface of an uncured hollow biscuit containing a gas-forming medium. The biscuit is then placed in a mold and subjected to heat to cause it to expand and the decorated sheet is inlaid on the surface of the biscuit and vulcanized thereto.

Badenhop Returns from Europe

Robert Badenhop, president of the Robert Badenhop Corp., crude rubber brokers at 200 Broadway, New York, recently returned from an extensive tour of the Continent during which he conferred with his representatives in London, Rotterdam, Hamburg and Paris. Mr. Badenhop said that the outlook for crude rubber consumption during 1925 is as follows:

"England, 30,000 tons, Germany and France each 35,000 tons, which will show substantial increases over 1924. The view of the crude rubber trade on the other side is that American manufacturers are at fault in regard to the price of rubber, due to their having been in the habit of purchasing from hand to mouth, and this aided considerably in the jump of values. Manufacturers will do well to anticipate their requirements by the purchase of futures.

"Conditions in Germany have improved greatly due to the workings of the Dawes plan. Bank interest rates which had been on a 36 per cent per annum basis, have been reduced to 12 to 15 per cent."

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The Use of Hydraulic Tables

Hydraulic Tables or Elevators Find Much Use in Rubber Factories for Placing or Removing Molds from Presses

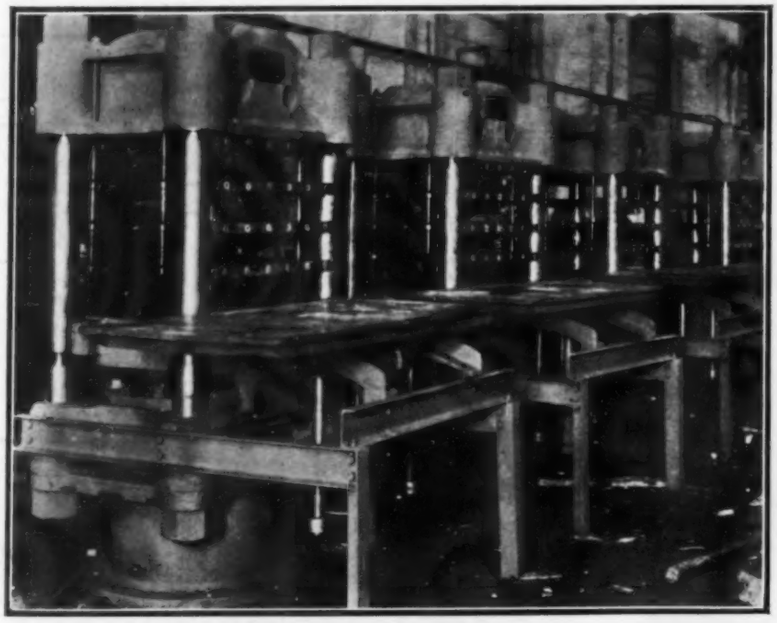
THE use of hydraulic tables or elevators, as they are often called, in operations which involve the handling of heavy molds is steadily becoming more universal in American rubber factories. They have been found to be both labor and time savers not only in rubber factories but in plants where other molded and vulcanized products are manufactured, such as mica, shellac, bakelite, redmanol, and fibre products.

The photograph below shows a battery of four Southwark Steam Platen Presses standing in the erecting shop of the Southwark Foundry & Machine Co., Philadelphia, Pa., one of the manufacturers of these hydraulic tables. These presses are equipped with steel platens with drilled steam passages. The size of the plates is 24 in. x 24 in. There are four openings. The presses operate on 2,000 lb. water pressure and have a capacity of 200 tons each. An hydraulic elevator or loading table is fitted to the front of the press and is raised or lowered to the level of any desired platen by small hydraulic rams. It will be noted that the table extends about two feet to the left of each press. This is for convenience in handling the molds when placing them or removing them from the press. The size and shape, of course, is usually specified by the user of the press.

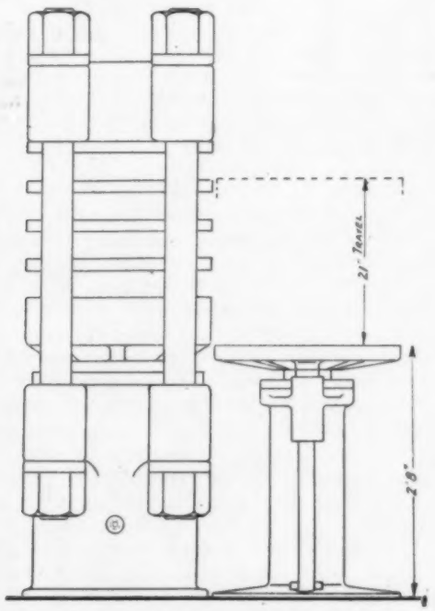
On the right is shown a photograph of a press and hydraulic table manufactured by the Farrel Foundry & Machine Co., Ansonia, Conn. The press has five drilled steel steam plates, each 42 in. square, with inlet and outlet connections. The main press ram is 16 in. in diameter and operates under 2,000 lb. pressure per square inch, giving a total pressure of 200 tons. The hydraulic elevating table is very simple in both operation and construction. It consists of a plain cast iron plate—approximately the size of the steam plates, guided on each side by vertical rods fastened to the press and operated by an independent ram which sets on the floor on which the press is mounted, as shown in the photograph. This auxiliary or elevating ram may be had in any size to suit the hydraulic pressure available. In fact, it is claimed that low pressure is better as it permits the use of a larger diameter ram, thus giving better support for the elevating table.

Press Manufactured by the Farrel Foundry & Machine Co., Ansonia, Conn., Fitted with a Hydraulic Elevator.

At the bottom of this page to the right is shown a cut of the hydraulic table lifts made to order for rubber manufacturers by the Adamson Machine Co., Akron, Ohio. This company has made a number of important installations of such table lifts in American rubber factories but only manufactures the tables to specifications. The height of the elevator illustrated is 2 ft. 8 in. and the travel 21 in.



24 x 24 in. 200 Ton Southwalk Steam Platen Presses Fitted with Hydraulic Elevators



24 x 24 in. Adamson Hydraulic Ram Attached to a Platen Shoe Press

Worm Gear Speed Reduction Units

Use of Worm Gear Speed Reduction Units Increases Production by Eliminating Break Downs Under Heavy Service and Reduces Motor Investment

By Asst. Master Mechanic,
One of the Largest Rubber Manufacturers, Akron, Ohio

IN the modern rubber manufacturing plant, as in practically every industry, the reduction of costs while maintaining a high standard of quality of the finished product is a vital factor. Unless production schedules can be maintained, manufacturing costs will increase rather than decrease, and thus the equipment used in the various processes must be dependable and capable of continuous operation.

Dependable for Continuous Operation

Our experience has proved that worm gear speed reduction units embody these characteristics. There are over 75 such units in use throughout the plant driving conveyors, calenders, tube machines, etc. Some of them have been in use 6 to 8 years and are giving satisfactory service in many places under continuous operation with heavy loads. On elevators and conveyors where the drives are not easily accessible, the small amount of attention required by the units and the limited space in which they can be used are valuable advantages.

An example of the dependability of such drives under continuous operation, is on our tube machines where they are subjected to the most severe service of any in our plant. On these machines, the units transmit the power from individual 50 hp. motors with variable speeds of 415 to 1,250 r.p.m. at a speed reduction of 4-5/6 to 1. They are water cooled, with the worm under the gear.

Hard Service—Low Cost

These machines are in operation 24 hours a day, which is three times the normal operation in the average plant, and their production is of first importance in keeping up to the manufacturing schedule for treads for all classes of tires. Maintenance work throughout the plant is kept up to strict standards, and particular attention is paid to lubrication. On the speed reduction units on the tube machines, the oil is examined every week, tested each month, and changed completely every 3 months.

The first units were put on some of these machines over 4 years ago and they have required no repairs due to any fault on their part. These gears seem to wear in rather than wear out. Their life is conservatively estimated at 15 years. As shown on the attached tabulation sheet, the total operating cost amounts to but $0.112 per unit, per 8 hours.

Replace Spur Gears and Chains

The tube machines were formerly driven by either spur gears or chains, which had many disadvantages. The spur gears were very noisy and made working conditions difficult in the department where the large number of tube machines were located. Since shipping them with worm gear units, which are practically noiseless, the personnel of the department has been changed at a very considerable reduction in labor cost. This change would undoubtedly have been difficult to make, had not the former noisy operation of the spur gears been eliminated.

The units enable the motor to be mounted at the side of a tube machine. As the machines are lined up with a view of utilizing the floor space to the fullest extent, this mounting is valuable since the motor thus comes under a table which is regularly required at the side of each machine.

With spur gears, the motors had to be at the ends of the machines. Thus at least 1,000 sq. ft. of floor space, with a value of over $500.00 a year was lost. The reduction units save this floor space and improve working conditions by helping to prevent congestion.

The chief disadvantages of the chain drives formerly used were the breakage resulting in lost production, and the loss of oil from the housings. Considering the value of the increased production alone, effected by the units, they undoubtedly repay their cost within the first 3 years.

Direct motor drives for slow speeds require a large highly expensive and power consuming motor. By making possible the use of high speed motors, which cost considerably less, speed reducers save several times their initial cost by the saving in the cost of the motor. These units have been found very smooth and positive in action, simple and strong in construction, and provided with effective means of lubrication.

Name of manufacturer supplied on request.

Tabulation of Costs

Cost of Operation—Tube Machine Drive

Depreciation—(first cost plus installation)—$750.00÷15 years	$ 50.00
*Average interest at 6% $\frac{16}{15} \times \frac{\$750.00 \times 0.06}{2}$	24.00
Repairs—estimated	15.00
Lubrication—including labor	16.45
Total annual cost	$105.45
Total cost per day—$105.45 ÷ 306 days	$ 0.34
Total cost per hour—$0.34 ÷ 24 hours	$ 0.014
Total cost per 8 hours—$0.014 x 8 hours	$ 0.112

*Allowing for interest earned by depreciation reserve.

ABSTRACTS

Is Rubber Partially Crystallized?

Z. angew. Chem., 1925, Vol. 38, 439-41

Unvulcanized Hevea rubber which has been stretched about 100 per cent gives an X ray spectrum similar to that produced by fibrous materials. Similar examination of an exceptionally stiff sample of pale crepe rubber in an unstretched condition also revealed the presence of "crystals" which were irregularly distributed. However there was a tendency to favor an orientation parallel to the edge of the sheet. The position of the interferences in the spectrum coincided with those which otherwise could have been developed by stretching. It is probable, however, that the "crystals" which cause the "fiber diagram" with stretched rubber are not pre-existent in the rubber, but are actually formed in the operation of stretching. If a sample of naturally "crystalline" rubber is milled, the product shows not crystalline interference phenomena, but these recur when the rubber is stretched. Heating to a temperature of 100 degrees C also removes natural "crystalline" character.

Para Nitrophenol as Mould Preventitive

Bull. Rubber Growers' Assn., 1925, Vol. 8, pages 243-4

Crepe rubber which has been soaked for a period of three hours in a dilute solution of paranitrophenol and then rolled up and stored in a damp chamber showed no signs of spor disease, but the effect of maturing was observable in the increased rate of vulcanization. A parallel sample without paranitrophenol developed spor disease.

Accelerators and Their Use

In Addition to Being Cheap a Good Accelerator Must Not Dry Rubber, Color Product or Have a Poisonous Action

By Dr. L. Stoll

THE subject of accelerators is one that is assuming greater importance from year to year and journals and patent literature are full of references to it. The following article is in the nature of review of the work that has been done on this important matter within recent years.

A vulcanization accelerator is a substance which, when added in small amounts to the rubber mixture, shortens the time of vulcanization or reduces the temperature of vulcanization, without affecting adversely the properties of the vulcanized rubber. There are two great classes of accelerators, the organic and the inorganic. The inorganic accelerators may be grouped as follows: (1).

1. First class accelerators. For example, sodium hydroxide, potassium hydroxide, which form polysulphides with sulphuretted hydrogen and sulphur, i. e. sulphides and hydrosulphides of the alkalies and the alkaline earth metals.

2. Second class accelerators, which convert the polysulphides into the sulphides. Substances such as, red lead and zinc oxide. (2).

The organic accelerators are divided into the following classes:

1. The hydrogen sulphide, polysulphide accelerators (3 and 4), to which class belong all the organic bases and compounds, which decompose to give bases during vulcanization and eventually yield polysulphide with the aid of sulphuretted hydrogen. The action of these accelerators is not dependent in any way on the presence of inorganic accelerators.
2. The carbosulphydryl-polysulphide accelerators. To this class belong the thiourates, the dithiocarbamates, the thiourames and the mercaptans. They act through the formation of metallic salts and eventually form polysulphides through the intermediate stage of the disulphides.

Requirements of a Good Accelerator

Practical rubber vulcanization requires the five following characteristics in a good accelerator: (5).

1. It must not dry out the rubber, make it "short."
2. It must not have a poisonous action on the rubber.
3. It must not color the finished product.
4. It must be cheap.
5. Its critical temperature, which means that temperature at which it begins to exert its accelerating action, must not be less than 105 degrees C, as otherwise vulcanization may be induced in the rubber during the mixing process.

Red lead, magnesia and zinc oxide have been used for a long time in the rubber industry. They were generally considered as mere fillers. There was very little published or known about the acceleration of vulcanization before the beginning of the present century. Rowley was one of the first to describe the acceleration of vulcanization (6). He used ammonia gas as an accelerator (7). At that time the rubber industry was not in the position to make any practical use of Rowley's discovery and his work was almost forgotten. Fawsitt mentioned the use of antimony iodine as an accelerator (8) and Weber used small quantities of iodine (9). The Dunlop Rubber Co. (10) and Twiss (11) used solutions of the caustic alkalies in organic hydroxyl compounds, such as butyl alcohol, amyl alcohol and phenol. Bishop (12) used small amounts of arsenic trioxide, arsenic pentoxide and metallic arsenic. Esch (13) added calcined magnesia admixed with strong alkali lyes, sulphonated oil soaps, regular soaps and eventually organic accelerators such as urea, thiourea and the like. These substances were made into a dry, soft powder, which was then mixed with the rubber before vulcanization. In November 1923 patents were issued on the use of compounds of zinc sulphate and cadmium sulphate with ammonia as accelerators. These compounds cannot however be stored for any length of time as they emit vapors of ammonia on standing with the result that their composition is changed and their accelerating action becomes irregular.

Organic Accelerators Far More Numerous

By far the greatest number of accelerators are of organic origin. The well-known dye house of Bayer & Co. has the credit of being the first to introduce the use of organic accelerators into the rubber industry. Piperidine and its homologues (14), for example methylpiperidine, as well as the derivatives of piperidine and its homologues (15 and 16), and the heavy, difficultly volatile aliphatic bases or their derivatives or the difficultly volatile derivatives of the easily volatile bases were among the first organic accelerators used (17 and 18). The Bayer Co. secured a basic patent in the year 1914 on the use of all organic bases whose dissociation constant is greater than 1×10^{-5} (19 and 20). Newton patented a series of organic compounds as vulcanization accelerators along the same lines as the aforementioned Bayer patents (21). These included the high boiling point bases or high boiling point derivatives of low boiling point bases of the aliphatic series, such as, for example the products obtained by the action of carbon disulphide on dimethylamine and tetramethylenediamine. He also acquired patents on the use of ammonia derivatives with a basic reaction, which split off ammonia during the vulcanization of the rubber, and also on such organic bases, with the exception of piperidine and its homologues and derivatives, whose dissociation constant is greater than 1×10^{-5} (22). For example the following substances are included in these classes of organic accelerators, sodium aminde, benzylamine, naphthylenediamine, quaternary ammonium bases, ammonia addition products, acetaldehyde, paraphenylenediamine, etc. R. de Long used dichloroaniline (23) and B. Molony several amine base compounds which are obtained by the action of carbon disulphide on beeswax waste.

Peachey employed the six following classes of organic accelerators:

Gummi Zeitung. Vol. 38, page 754 *ff.*

1. *The India Rubber Journal*, March 31, 1923, page 13 *ff.*; *Gummi Zeitung*, Number 7 and 8, pages 11 and 112, Nov. 23, 1923.
2. Behncke, *Gummi Zeitung*, Number 37, page 898, June 10, 1921.
3. Behncke, ditto.
4. Bedford, *Gummi Zeitung*, Numbers 23 and 24, page 370 *ff.*, March 16, 1923.
5. Lothar Weber, *The India Rubber Journal*, May 20, 1923, page 17 *ff.*; *Gummi Zeitung, volume* 43, Aug. 3, 1922, pages 1216 and 1219.
6. Rowley, English Patent No. 787, 1881.
7. Rowley also secured protection on the vulcanziation of rubber with the aid of sulphuretted hydrogen and sulphur dioxide.
8. *Journal of the Society of Chemical Industry*, 1892; page 332.
9. Weber, *Journal of the Society of Chemical Industry*, 1895, page 436.
10. English Patent No. 125,695, 1918.
11. Twiss, United States Patent No. 1,413,813, March 7, 1919.
12. Bishop, *Journal of the Society of Chemical Industry*, July 20, 1923, page 303; *Gummi Zeitung*, numbers 21 and 22, Feb. 29, 1924 pages 347-8.
13. Esch, German Patent No. 375,776, Sept. 2, 1922.
14. German Patent number 265,221, Year 1912.
15. German Patent Number 266,219, Dec. 25, 1912.
16. Dr. Gottlob, United States Patent No. 1,126,469, Oct. 16, 1913.
17. Bayer, German Patent Number 269,512, Feb. 26, 1913. Addition to German Patent Number 265,221.
18. Bayer, Austrian Patent Number A6233-13.
19. Bayer, German Patent Number 280,188, Jan. 1, 1914.
20. Bayer, Austrian Patent Number A5320-14.
21. Newton, English Patent Number 12,277, June 2, 1913.
22. Newton, English Patent Number 12,661, May 22, 1914.
23. R. de Long, United States Patent Number 1,364,732, July 20, 1920.

1. The products that are obtained by the action of aromatic amines on aliphatic or aromatic aldehydes or by the action of an aromatic aldehyde on ammonia. Such compounds as formaldehyde aniline, benzylidene aniline and hydrobenzamide are included in this category (25).
2. Paranitrosomethylaniline or its derivatives (26).
3. Paranitrosodiphenylenediamine or a reduction product of the nitroso compounds that are mentioned in the Peachey English patent No. 4263 of Feb. 19, 1914 (27 and 28).
4. Paranitrosodimethylaniline or its homologues (29 and 30).
5. Paranitrosodiphenylamine (31).
6. Nitrosophenol or its homologues, such as nitrosocresol (32).

During vulcanization the para nitrosodimethylaniline decomposes to give colored condensation products which are seen as spots in the vulcanized product. For this reason Peachey used the substances that are formed by the action of sulphur on paranitrosodimethylaniline or its homologues and which are distilled over at a temperature of 130 to 135 degrees C (33 and 34).

The North British Rubber Co. discovered that the "nitrogen accelerators" must first enter into a reaction with the sulphur in the rubber mixture and that this compound is the one that functions as a vulcanization accelerator (35). In accordance with this discovery liquid or solid products, which are obtained by the decomposition of paranitrosodimethylaniline or its derivatives with sulphur, are patented as accelerators. In contradistinction to German Patent No. 351,974 the entire reaction product is claimed against the fraction that boils between the temperatures of 130 to 135 degrees C.

According to Barthold and Hasselt, (36) nitrosodimethylaniline yields crystallizable double compounds with aniline and its homologues, which exert a greater accelerating action than what may be expected by adding together the accelerating capacities of the individual substances. As example of such substances may be mentioned the double compounds that are formed between two molecules of nitrosodimethylaniline and one molecule of diphenylamine (boiling point 62 degrees C), one molecule of ortho toluidine (boiling point 72 degrees C), one molecule of alphanaphthylamine (boiling point 82 degrees C), one molecule of dimethylaniline (boiling point 84 degrees C), one molecule of aniline (boiling point 93 degrees C) and one molecule of phenylenediamine (boiling point 121 degrees C).

The Goodyear Tire & Rubber Co. (37) and Scott (38) used a substitute of arylurea as an accelerator of vulcanization. This substance contains one or more aryl groups, one of which is in the ortho position with respect to the urea group. For example the reaction of that product obtained by the action of carbon disulphide on an ortho aryl substituted aromatic amine may be considered as typical of this group of accelerators.

Further Organic Accelerators

Cadwell (39) patented an accelerator which consists of a urea disulphide with substituted aryl and alkyl groups, for example dimethyl-diethylphenyl urea disulphide. Another one of his accelerators consists of zinc butylxanthogenate or diphenyldimethylthiourea (40). Dimethyldiphenylurea disulphide is prepared by dissolving 480 parts of monomethylaniline, 170 parts of carbon disulphide and 285 parts of iodine in alcohol. The crystals that are precipitated when this solution is allowed to stand in light are recovered, washed with alcohol and then dried.

Bedford (41) allows carbon disulphide and sulphuretted hydrogen to act simultaneously on a paranitroso compound (42). Lorentz used a tetra-alkylthiouramine sulphide as an accelerator, and Weiss (44) used a disubstituted guanidine. The latter compound is prepared by the treatment of a symmetrical disubstituted urea with ammonia and a metallic compound, such as zinc oxide, lead oxide and lead carbonate, which can eliminate the sulphur from the urea. This substance is patented by the Naugatuk Chemical Co. (45) and the Canadian Consolidated Rubber Co. (46). The former company (47) has patented the use of aniline and oxybutylthiocarboxylic acid as an accelerator and the use of organic oxidizing agents is patented by Ostromislensky (58).

Compounds That Evolve Oxygen

The Bayer Co. (49) has patented all inorganic and organic compounds for use as accelerators that yield a part of their oxygen content at the temperatures that usually are met with in vulcanization. By the addition of oxygen-yielding substances, as for example antimony pentoxide, lead oxide and lead superoxide, sometimes in combination with an amine and the like, it is possible to obtain a finished vulcanized product which possesses a higher stretch, tensile strength and elasticity than is usual (50 and 51). The proportion of the accelerator in the rubber mixture is increased to over five per cent when it is desired to secure a vulcanizate with a particularly high elasticity.

Oily substances, such as petroleum, linseed oil, castor oil, paraffine oil, safflower oil, aniline, alkyl anilines (55) and dimethylaniline (56), when used in the proportion of ten per cent of the rubber weight, and more, have the effect of increasing the elasticity of artificial rubbers. The addition of tar oil serves to eliminate the quality of becoming sticky that is ordinarily possessed by such mixtures.

Dinthroanthraquinone (Gibbons) in combination with litharge, amino cymen (Andres), anhydroformaldehyde (Danerth) (57), piperidine-piperidyl-dithiocarbamate (Whitby) (58) are also used as accelerators of vulcanization. Tetramethyl-thio-uramsulphide (59) should also be included.

Commercial Products as Accelerators

There are quite a large number of products found in ordinary commerce that are employed to a greater or lesser extent as accelerators. For example nitron (60) which is ¼ diphenylene aniline dihydrotriazol, is a yellow powder, with a melting point of 187 to 189 degrees C. When it burns it evolves vapors which have an odor similar to that of triphenylguanidine. It is a very strong base and a good accelerator. Tuffite (61) is a vulcanic ash and is mined in Oregon at Mount Angel. It is very well suited as a filler and after it has been ignited and subjected to special treatment it comes on the market as the accelerator tuffin. Erwacite is a grayish black powder. It contains several ingredients and is furnished by the Runge Co. at Spandau. Xanthopone (62) or ethylene zinc xanthogenate is a good accelerator. Bayer's

24. Molony, United States Patent Number 1,343,224, July 17, 1919.
25. Peachey, English Patent Number 7370, March 24, 1914.
26. Peachey, English Patent Number 4263, Feb. 19, 1914.
27. Peachey, English Patent Number 10,833, May 2, 1914.
28. Peachey, United States Patent Number 1,157,177, Feb. 12, 1915.
29. Peachey, German Patent Number 232,088, Feb. 17, 1915.
30. Peachey, Austrian Patent Number A703-15, Feb. 17, 1915.
31. Peachey, English Patent Number 10,833, Addition to Patent Number 4263-4.
32. Peachey, German Patent Number 328,611, Feb. 3, 1917. Addition to German Patent Number 323,088.
33. Peachey, German Patent Number 351,974, Aug. 13, 1918.
34. Peachey, Austrian Patent Number 4657-18, Aug. 17, 1918.
35. English Patent Number 130,857.
36. German Patent Number 325,306, Jan. 5, 1919.
37. English Patent Number 153,890, Year 1920.
38. Scott, United States Patent Number 1,356,495, Nov. 10, 1919.
39. Cadwell, English Patent Number 191,085, Feb. 15, 1922.
40. Cadwell, English Patent Number 177,493, Feb. 15, 1922.
41. Bedford, United States Patent Number 1,477,803, 1923.
42. The paranitroso compound is dissolved in a medium which contains carbon disulphide in excess and then sulphuretted hydrogen gas is introduced.
43. Lorentz, United States Patent Number 1,413,172, March 30, 1920.
44. Weiss, United States Patent Number 1,411,231, Nov. 12, 1921.
45. Naugatuk Chemical Co., English Patent Number 199,354, April 5, 1923.
46. Canadian Consolidated Rubber Co., Canadian Patent Number 236,465, 1923.
47. Naugatuk Chemical Co., English Patent Number 174,915, 1921.
48. Ostromislensky, United States Patent Number 1,342,457 and 1,342,458, July 28, 1916.
49. Bayer, German Patent Number 328,610, Feb. 20, 1917.
50. Bayer, German Patent Number 328,610, Feb. 20, 1917.
51. Bayer, German Patent Number 326,819, Feb. 20, 1917.
52. Bayer, German Patent Number 303,984, Feb. 20, 1917.
53. Bayer, German Patent Number 326,819, Feb. 20, 1917.
54. Bayer uses ten per cent of an amino compound and from ten to fifteen per cent of antimony pentoxide.
55. Bayer, German Patent Number 301,757, Dec. 28, 1915.
56. Louis Peter, German Patent Number 315,321, Nov. 23, 1918.
57. *The India Rubber Journal*, Sept. 25, 1920; *Gummi Zeitung*, 6, Feb. 5, 1921, page 124.
58. Whitby and Walker, *Gummi Zeitung*, 47, Aug. 19, 1921, page 1182.
59. *The India Rubber World*, Oct. 1, 1923, page 15; *Gummi Zeitung*, 27, April 4, 1924, page 461.
60. Romani, *Gummi Zeitung*, 34, May 23, 1921, 38, page 638.
61. *Gummi Zeitung*, 19, Feb. 10, 1922, 36, page 532.
62. *Gummi Zeitung*, 48, Sept. 1, 1922, 36, page 1353.

vulcacite (63) is used extensively. Vulcanite P is piperidine piperidyldithionic acid vulcaite A is aldehyde amminia, vulcacite D is diphenylguanidine, vulcacite H is hexamethylenetetramine. Bayer's thiocarbanilide is diphenylthiourea. The Peachey nitroso compounds are known as accelerenes (64). The zinc alkyl xanthogenates and zinc thiophenols (65 and 66) have also attained a certain importance as accelerators of vulcanization.

Use of Inorganic Accelerators

Litharge, magnesia, zinc oxide and calcium oxide (lime) are the most useful of all the inorganic accelerators. They were used almost exclusively up to the beginning of the present century. At the present time they are used more or less in combination with organic accelerators. When used in the proportion of one per cent (67) zinc oxide has a stronger action than litharge, but as the percentages are increased, the litharge gives better results than the zinc oxide. A mixture of litharge and zinc oxide in suitable proportions yields an accelerator which possesses very favorable properties. Accordingly litharge and zinc oxide (and magnesia as well to a certain degree) bear a very definite relation to one another as far as their accelerating action is concerned.

The addition of litharge to a para-sulphur mixture (68) makes possible the vulcanization of the rubber in the free air, while the zinc oxide plays a particularly important role in the activation of organic accelerators. The black coloration in the vulcanized product which is formed when litharge is used and which is due to the formation of lead sulphide, is avoided, according to Bernstein (69) by the addition of an oxidizing agent which converts the black lead sulphide into lead sulphate. Sodium perborate, chlorates, chromates, persulphates, barium peroxide and the like have been found to be suitable for this purpose.

The action of small amount of magnesia as accelerator is for the most part of secondary importance only and is dependent on the presence of certain foreign substances, above all of nitrogen compounds (70).

Then again magnesium oxide and calcium oxide have the faculty of promoting the hardening of the vulcanized rubber (71).

Nitron is a good accelerator, whose action is dependent in the presence of zinc in the rubber mixture, but then again its action is considerably improved by the admixture of ammonium carbonate with the rubber (72). The zinc alkyl xanthogenates and the zinc salts of other alkyl xanthogenic acids exhibit no accelerating properties when used in admixture with rubber and sulphur alone at a temperature of 145 degrees C. On the other hand when they are employed in admixture with zinc oxide or cadmium oxide perfect vulcanization is obtained at a temperature as low as 135 degrees C. A mixture which contains 90 parts of rubber, 10 parts of sulphur, 5 parts of zinc ethylxanthogenate and one part of zinc oxide, when vulcanized for a period of 20 minutes at a temperature of 98 degrees C (73), will give a vulcanized rubber which possesses a strength of 0.5 kilogram per square millimeter and a corresponding stretch of 486 per cent. When the time of vulcanization is increased to from 20 to 120 minutes, these values remain unchanged (74).

Erwacite is a good accelerator whose action is not dependent in the presence of oxide of zinc in the rubber mixture, while xanthopone, when mixed with sulphur and oxide of zinc at a temperature varying between 108 and 125 degrees C, gives good results (75). The Bayer products, which are put out on the market under the name of vulcacite, possess a high degree of activity (76), which can be enhanced in individual cases by the addition of zinc oxide. The very strong accelerating power which is possessed by these accelerators may be lessened by the reduction in the amount of sulphur that is added to the rubber mixes and by the reduction of the temperature (77).

The vulcanized rubber samples obtained with the aid of vulcacite possess a resistance to rupture which rises within a small vulcanizing period, and then again falls just as quickly. This then means that when vulcacite is used, it is very easy to obtain over-vulcanization of the rubber. The amount of vulcacite that need be added in the case of the marks P, A and D is one per cent, in the case of H is one and one half per cent, and in the case of thiocarbanilid it is two per cent. Mixes which contain vulcacite P and zinc oxide will even vulcanize between the warm rolls or on standing. In mixing the accelerator with the rubber, it is necessary to fix a half of the rubber with sulphur and zinc oxide and the other half with the other substances that are added to the rubber and the vulcacite. Then the two rubber mixes are incorporated between rolls that are just warm enough so that the hand can be held on them comfortably (78 and 79).

The accelerating action of vulcacite A is also increased by the addition of small amounts of zinc oxide and zinc oxide and magnesia (80). Large amounts of zinc oxide or magnesia alone have a bad effect on the accelerating powers of the compound. There is no difficulty encountered in mixing the ingredients together. Vulcacite D and zinc oxide exhibit no particular difference from the use of the accelerator alone, but the acceleration is increased by the admixture of lime, magnesia and litharge (81). The vulcanized products are not discolored by vulcacite D. The customary addition of sulphur is between three to five per cent. Dark and light factis, when vulcanized with this accelerator, seem to undergo a retardation in vulcanization (82).

Vulcacite H and zinc oxide possess high accelerating activity and yield vulcanized products which have a particularly high strength (83). Hexamethylenetetramine, which just like aniline and aniline formate has a very bad effect upon the workers in the plant, has a particularly strong accelerating action (84). Small additions of zinc oxide are without effect on the thiocarbanalide accelerator (85).

Accelerene Accelerators

The accelerenes (86) are likewise good accelerators, and their action is retarded by the admixture of litharge and increased by the addition of magnesia (87). The acceleration is enhanced by the addition of zinc oxide and magnesia (88 and 89). This substance, just like paranitrosodimethylaniline and paraphenylenediamine, is poisonous to a certain extent and troubles the workers who mix it. The samples of vulcanized rubber obtained from mixtures containing aniline formaldehyde, just like those that are secured when

63. Gottlob, *Gummi Zeitung*, 27-28, April 13, 1923, 37, pages 440 to 42.
64. Peachey, *Kunstoffe*, 1918, pages 53 to 56; *Gummi Zeitung*, 33, May 17, 1918, 32, page 477.
65. Ostromislensky, *Gummi Zeitung*, 32-34, March 16, 1923, page 371.
66. Twiss, Thomas, Jones, *Gummi Zeitung*, 34, May 23, 1924, 38, page 638.
67. Calculated on the weight of the rubber.
68. In the case of other varieties of rubber, as for example African rubber, this is not the case. According to Weber the litharge enters into reaction with the resinous matters that are contained in the Hevea rubber and the reaction product that is formed in this manner makes possible vulcanization of the rubber in the free air.
69. Bernstein, *The India Rubber Journal*, Aug. 12, 1922, page 5; *Gummi Zeitung*, numbers 11 to 12, Dec. 22, 1922, page 177.
70. Kratz and Flower, *The Journal of Industrial and Engineering Chemistry*, October, 1920, pages 971-4; *Gummi Zeitung*, Dec. 10, 1920, 35, page 235.
71. Peachey, *Kunstoffe*, 1918, pages 53 to 56.
72. *Gummi Zeitung*, Number 34, May 23, 1924, 38, page 9 638.
73. Good vulcanized products are also obtained at as low a temperature as 58 degrees C.
74. Twiss, Thomas, Jones, *Gummi Zeitung*, 34, May 23, 1924, 38, page 638.
75. *Gummi Zeitung*, 48, Sept. 1, 1922, 36, page 1353.
76. According to Gottlob, *Gummi Zeitung*, Nov. 7, 1918, page 33, this depends on the basicity of the substance and not on its structure.
77. Gottlob, *Gummi Zeitung*, 30, pages 303, 326.
78. Gottlob, *Gummi Zeitung*, numbers 27 and 28, March 14, 1923, 37, pages 440-2.
79. The amount of sulphur that is added to the rubber mixture must not amount to any more than from one to two per cent.
80. Williams, *The India Rubber World*, Nov. 1, 1921, page 108; *Gummi Zeitung*, number 16, Jan. 20, 1922, 36, page 462.
81. *Le Caoutchouc et la Gutta-percha*, April 15, 1923, page 1783; *Gummi Zeitung*, numbers 47 to 48, Aug. 31, 1923, 37, page 791.
82. Ames, *Journal of the Society of Chemical Industry*, April 25, 1924, page 117; *Gummi Zeitung*, 39, June 27, 1924, 38, page 770.
83. A similar effect may be obtained with the aid of magnesium oxide.
84. *Gummi Zeitung*, 43, Aug. 3, 1922, pages 1216 to 17.
85. Gottlob, *Gummi Zeitung*, numbers 27-8, April 14, 1923, pages 440-2.
86. The action of the nitro bases rests on the action of nitroso groups which are directly combined in the molecule.
87. Peachey, *Kunstoffe*, 1918, pages 53 to 56; *Gummi Zeitung*, 33, May 17, 1918, 32, page 477.
88. Williams, *Gummi Zeitung*, number 16, Jan. 20, 1922, 36, page 462.
89. A mixture of zinc oxide and magnesia has a particularly favorable effect.

paranitrosodimethylaniline is employed, are poorly colored (90, 91 and 92).

The action of aniline on the vulcanization of rubber is not dependent on the presence of zinc oxide in the mixture, while diphenylthio acids work only when the mixture contains the oxide (93). Oleic acid, sodium oleate and lead oleate have a particularly strong effect on the vulcanization of rubber, especially those of poorer quality (94). Dithiobenzoic acid (95) has a very potent effect in accelerating the vulcanization of rubber, when used in combination with zinc oxide (96). On the other hand the monothiobenzoic acids and their salts have no accelerating action at all (97). The dithiocarbamates have only a mild action when used alone, but are very powerful accelerators when zinc oxide is also present in the rubber mixtures (98, 99 and 100).

The zinc alkyl-dithiocarbamate is useful, just like zinc oxide, in increasing the accelerating powers of various substances, while zinc ethyl xanthate and zinc thiophenol are able to effect vulcanization at the ordinary room temperature (101 and 102). Piperidine-piperidyl-dithiocarbamate is able to shorten the time of vulcanization by seven eights, when one per cent of the accelerator is added to the rubber (103). Litharge has the power to increase the accelerating activity of tetramethyl-thiouramsulphide. The zinc salt of tetramethylthiouramsulphide is one of the most powerful accelerators known, but the lead salt is not so powerful. The red, blue or green colors that it is desired to secure in the vulcanized products are not adversely affected by these vulcanization accelerators, and it is possible to substitute antimony salts by red dyestuffs (104). Thiouramsulphide has no accelerating action on the vulcanization of a rubber mixture containing sulphur and zinc oxide at the ordinary temperatures. Sulphuretted hydrogen converts the disulphide in the presence of zinc oxide at ordinary temperatures into a dithiocarbamate and then vulcanization ensues at the ordinary temperature (105 and 106).

The technical action of the accelerators is determined in general by a comparison between the physical properties of the vulcanized products and the time that is spent in the vulcanizing process. For a comparison of the coefficients of vulcanization forms no measure for the determination of the physical properties of the vulcanized products obtained with any individual accelerator (107 to 114). G. Martin suggested the use of a coefficient of acceleration (115). He considered the accelerator factor K as the ratio of the degrees of vulcanization in the presence of an accelerator Sa and the degree of acceleration in the absence of the same Sb. K may therefore be written to be equal to Sa divided by Sb. It is apparent that Martin compares the coefficients of vulcanization of the rubber under the two conditions.

I would like to base the coefficient of acceleration or the accelerator factor on physical data, and hence I make the factor K stand equal to the ratio Za to Zr. In this ratio Za is the resistance of the rubber tension or some other characteristic physical property in the presence of the accelerator and Zr is the same property when the accelerator is absent.

It is important here to mention in the nature of a warning that such investigations will give comparable results only when the rubber samples are all subjected to the same preliminary treatment, are vulcanized under exactly the same conditions, are stored for exactly the same length of time before they are treated further and are investigated and tested under exactly the same testing conditions. In order to be able to compare the activity of different accelerators the aforementioned accelerator factor is employed for an addition of one per cent of the accelerator. Or according to Kratz and Flower (116) one-hundredth of a molecular weight of the accelerator is added to the rubber mixtures in making these comparative tests. Shepard, Normann, Stanley and Krall (117) measure the accelerating power of various quantities of the accelerators which are required to yield a vulcanized product with the same physical properties, under definite conditions of vulcanization, as a standard rubber mix (118 and 119). Whitby, Stafford and Cambron (120) have prepared a comparative cement (121), and after the accelerator is added they determine the time it takes for the sample to become hard while it is being heated and stirred.

Chemical Changes in the Accelerators

The chemical changes and transformations that take place in accelerators have been subjects for many investigations and researches. Bedford and Scott (122) studied the changes that take place in an accelerator under the influence of the temperatures that are current during vulcanization in the presence of sulphur and in its absence as well. Methylene-D-phenyldiamine and methyleneaniline (123) form thiourea derivatives in the presence of sulphur. In the reaction that takes place between 210 grams of mthyleneaniline and 96 grams of sulphur at a temperature of 150 degrees C, there are formed one molecule of carbon disulphide, one molecule of sulphuretted hydrogen gas and about ninety-five per cent of thiourcarbanilide. This substance is also formed along with others in the reaction that takes place between methylene-D-phenyldiamine and sulphur. The formation of a mustrad oil is observed in the case of the mono, di and trithiourea substitution products (124).

According to Bruni and Romani (125) thiocarbanalide decomposed in the heat to give phenyl mustrad oil and aniline. The first compound then reacted with the sulphur that is present in the rubber mixture to form mercaptobenzothiazol which is then converted into a disulphide. According to Bedford (126) this compound is transformed into the tautometric form in the presence of zinc oxide with the simultaneous formation of a zinc mercaptide. The latter substance possesses the accelerating power. Twiss (127) considers likely the formation of compounds from disulphides, dithio-

(*Continued on Page* 418)

90. The light colored vulcanized products assume a yellowish color as they grow older.
91. Lothar Weber, see reference cited above.
92. Peachey does away with this disadvantage of paranitrosodimethylaniline in a process which is described in German Patent Number 351,974, Aug. 13, 1918.
93. Kratz and Flower, *Gummi Zeitung*, 48, Aug. 26, 1921, page 1206.
94. Lothar Weber, see reference cited above.
95. This is manufactured, in accordance with the process described by Bloch, from persulphuretted hydrogen and benzaldehyde in the presence of condensing agents.
96. Five minutes at a pressure of two atmospheres, two days at a temperature of 20 degrees C.
97. Romain, *Le Caoutchouc et la Guttapercha*, Dec. 15, 1922, page 1626; *Gummi Zeitung*, numbers 39 and 40, July 3, 1921, 37, pages 651-2.
98. Thomas, *The India Rubber Journal*, March 31, 1923, page 13 ff.; *Gummi Zeitung*, numbers 7 and 8, Nov. 23, 1923, 38, pages 111-2.
99. Bedford and Sebrell, *Gummi Zeitung*, 47, Aug. 19, 1921, 35, page 1182.
100. Bedford and Scott, *Gummi Zeitung*, 23-24, March 16, 1923, 37, page 371.
101. Bedford and Scott, see reference cited above.
102. Bedford and Scott, see reference cited above.
103. Whitby and Walker, *Gummi Zeitung*, 47, Aug. 19, 1921, 35, page 1182.
104. *The India Rubber World*, Oct. 1, 1923, page 15; *Gummi Zeitung*, 27, April 4, 1924, 38, page 461.
105. *Gummi Zeitung*, numbers 23 and 24, March 16, 1923, 37, page 371.
106. In connection with the above the rapid vulcanization process which was developed by Ostomislensky (1916) at ordinary temperature by the agency of thiocarbamates, of piperidine, methylamine and other organic bases, must be mentioned.
107. Shepard, Normann, Stanley, Krall, *The Journal of Industrial and Engineering Chemistry*, October 1922 page 951; *Gummi Zeitung*, 31-2, May 11, 1923, 37, pages 508 to 510.
108. Weber, *Chemistry of India Rubber*, 1902, page 93.
109. Axelrod, *Gummi Zeitung*, 1909, page 352.
110. Schidrowitz, *Rubber Industry*, 1914, page 212.
111. Spence, *India Rubber Journal*, 1916, page 861.
112. De Fries, *India Rubber Journal*, 1917, page 101.
113. Stevens, *India Rubber Journal*, 1917, page 220.
114. Cranor, *India Rubber World*, 1919, page 137; *Gummi Zeitung*, 24, March 12, 1920, page 498.
115. Martin, *The India Rubber Journal*, Dec. 22, 1923, page 19; *Gummi Zeitung*, 31, May 2, 1924; 38, page 561.
116. Behncke, *Gummi Zeitung*, 48, Aug. 26, 1921, 35, page 1206.
117. *The Journal of Industrial and Engineering Chemistry*, October 1922, page 951 ff.; *Gummi Zeitung*, 31-32 of March 11, 1923, 37, pages 508-10.
118. Consists of forty parts of rubber, forty-eight parts of zinc oxide and three parts of sulphur.
119. Sixty minutes at a temperature of 141.7 degrees C.
120. Whitby, *Journal of the Society of Chemical Industry*, Aug. 10, 1923, page 333; *Gummi Zeitung*, numbers 21 and 22, Feb. 29, 1924, pages 354-7.
121. A test mixture is made from one hundred parts of rubber, ten parts of zinc oxide and six parts of sulphur. Of this mixture 12.5 grams are stirred up with one hundred cubic centimeters of xylol and twenty grams of this cement are then employed for testing purposes.
122. *Gummi Zeitung*, numbers 23 and 24, March 16, 1923, page 371.
123. Bastide, French Patent Number 407,883, 1913.
124. *Gummi Zeitung*, 7-8, Nov. 23, 1923, pages 111-2.
125. Bruni and Romani, see reference cited above.
126. Stafford, Whitby, *Gummi Zeitung*, 38, pages 564-5.
127. Twiss, see reference cited above.

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THE MARKET PLACE Section Continued on Second Page Following.

MARKETS

Cottons and Fabrics

NEW YORK, Sept. 15, 1925

Seldom at this season in former years have opinions concerning the size of the cotton crop differed so widely as during the past two weeks. This divergence of views was due primarily to the irregular conditions throughout the belt because of the uneven distribution of rainfall and to the almost diametrically opposed constructions placed upon the record movement. As a result of the uncertainty which prevailed, the publication of the Government crop report on the 8th was awaited with keen interest by the trade and with some degree of apprehension on the part of speculative shorts, a number of whom, fearing serious deterioration in many sections, were prompted to cover.

Their fears were not unfounded for the Government crop indication of 13,740,000 bales showed that the prospective yield had decreased 250,000 bales during the fortnight ended Sept. 1. The Weather Report bore out the fears of deterioration; since the beginning of this month, deterioration had continued to such an extent that, unless relief comes quickly, the official mid-September crop indication is likely to be less than the final outturn of last season.

With production possibilities attracting so much interest, the question of probable consumption is likely to be overlooked. According to statistics compiled recently by the International Spinners' Federation, the world's mills, during the six months ending July 31, consumed 7,022,000 bales of American cotton exclusive of linters. Although economic conditions in Great Britain and Germany are not as favorable as earlier in the year but in other European countries good progress continues to be made and, should the funding of the French and Italian debts to the United States be successfully negotiated, it seems probable that imports of American cotton by France and Italy will materially increase. Domestic consumption is running considerably ahead of this time last year. Manufacturers' profit margins in a number of lines are more satisfactory than they were a year ago, and with the purchasing power of the country at a high level, it is not unlikely that the improvement will continue.

New York Prices

	Open	High	Low	Close	Close Sept. 1
October	24.30	24.59	24.03	24.03	22.11
December	24.65	24.95	24.40	24.46	22.35
January	24.00	24.27	23.70	23.72	21.80
March	24.38	24.59	24.03	24.09	22.10
May	24.65	24.87	24.33	24.33	22.42

TIRE FABRICS

Although production curtailment has begun in some of the large rubber factories, tire producers are using their full quota of fabric shipments and fabric mills continue to be as active as they were a month ago. Inquiries have been good in the market during the past two weeks. Low quotations resulted in the placing of a part of this business. Orders included a number of small contracts for carded peeler cords and combed and carded Egyptian cords were placed. A number of fabric mills were ready to name the same prices as they did before the Government cotton report was published. Most of the contracts placed during the past fortnight were for goods to be delivered this year and through the first half of 1926.

CORD FABRICS

Combed Sakellarides		Nominal	
Combed Peeler	lb.	Nominal	
Carded Peeler		.49 @	.51
Combed Egyptian uppers	lb.	.65 @	.70
Carded Egyptian uppers	lb.	.58 @	.63

SQUARE WOVEN

17¼-ounce Egyptian uppers, combed	lb.	Nominal	
17¼-ounce Egyptian uppers, carded	lb.	.56 @	.61
17¼-ounce Sakellarides, combed	lb.	Nominal	
17¼-ounce Peeler, carded	lb.	.47 @	.49

Ducks—Small and frequent sales were a feature of trading in the last two weeks. The price basis was changed but little, with trading less resorted to, and the market that much firmer as a consequence. The cotton duck market has been described as healthy. Buyers have been numerous, although few have had the courage to commit themselves a number of months ahead. A few have bought through January.

Burlaps—Indian jute district managers estimated the crop for the 1925-26 season as 6,983,400 bales of 400 pounds each for 64 out of 67 districts, compared with 7,239,000 for 1924-25. The missing districts usually yield 14 per cent of the entire jute crop or 1,000,000 bales. The effect of this report was to cause the withdrawal of offerings and some extravagant prices were announced. The official report announced the next day forecast a yield of 7,851,328 bales for the 67 districts. A good volume of business was placed on succeeding days.

SHEETINGS

40-inch, 2.50-yard	yd.	.15 @	—
40-inch 2.85-yard	yd.	.13 @	—
40-inch 3.15-yard	yd.	.13½ @	.13⅝
40-inch 3.60-yard	yd.	.11¼ @	—
40-inch 3.75-yard	yd.	.10¾ @	—
40-inch 4.25-yard	yd.	.09¼ @	—

DUCKS

Belting	lb.	.41 @	.42
Hose	lb.	.41 @	.42
Enameling	lb.	.42 @	.48
Shoe Ducks	lb.	.48 @	.50
Single filling	lb.	.19 @	.20½
Double filling	lb.	.22 @	.23

BURLAPS
(Carload Lots)

7½-ounce 40-inch	8.40 @	8.45
8 -ounce 40-inch	8.50 @	8.55
10 -ounce 40-inch	10.80 @	10.90
10½-ounce 40-inch	11.10 @	—

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FACTICE—Prevents blooming, makes colors fast and a smoother batch.
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MOLDS AND CORES—
Tire building equipment; general machine work.
The Akron Equipment Co.
Akron, Ohio

FABRICS—Tire fabrics, Egyptian—Peeler, Karded and Combed, Cord and Square.
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RECLAIMED RUBBER—
for all purposes.
Rubber Regenerating Co.
Naugatuck, Conn.

THE MARKET PLACE Section Continued on Second Page Following.

Reclaimed Rubber

NEW YORK, Sept. 15, 1925

The factories seem to be holding off their purchases of reclaimed rubber because of the uncertain condition of the crude rubber market. No large business was placed. Deliveries of reclaimed are good on contracts and an extension of some in larger quantity would not be a surprise if crude rubber continues at a high price. The present state of the market is giving reclaimers a not unwelcome opportunity to catch up on back orders which are quite extensive. A fair quantity of scrap is being purchased.

Friction (Uncured)				
No. 1	lb.	.50	@	.55
No. 2	lb.	.40	@	.45
High Tensile Black				
Super-Reclaim No. 1	lb.	.26	@	.28
" " No. 2	lb.	.16½	@	.17½
Shoe				
Unwashed	lb.	.10½	@	.11
Washed	lb.	.13½	@	.14
Tube				
No. 1 (Floating)	lb.	.26	@	.27
No. 2 (Compounded)	lb.	.19	@	.19½
Tires				
Black unwashed	lb.	.10	@	.11
Black, washed	lb.	.12	@	.13
Black, selected tires	lb.	.13	@	.13½
Dark Gray	lb.	.14½	@	.15
Light Gray	lb.	.15½	@	.16
White	lb.	.19	@	.19½
Truck	lb.	.11	@	.11½
Miscellaneous				
Mechanical Blends	lb.	.08	@	.09
Red, High Grade	lb.	.18	@	.18½

Scrap Rubber

NEW YORK, Sept. 15, 1925

Dealers report that reclaimers are interested only in conservative quantities and there is lacking any very broad concerted movement in scrap. The uncertain condition of the crude rubber market has been reflected in the scrap market which is marking time. Some dealers have reported an increase in factory inquiry.

Auto tire peelings		.01½	@	—
Standard White auto	ton	35.00	@	—
Mixed auto	ton	23.00	@	23.50
Bicycle tires	ton	10.00	@	11.00
Clean solid truck tires	ton	33.00	@	36.00
Boots and shoes		.02¼	@	.02½
Arctics, untrimmed		.01	@	.01⅛
Arctics, trimmed		.01⅝	@	.01⅞
Inner tubes, No. 1		.07¾	@	.08
Inner tubes, compounded		.06¾	@	.07
Inner tubes, red		.05	@	.05¼
Air Brake Hose	ton	16.00	@	18.00
Rubber hose	ton	16.00	@	17.00

Crude Rubber

NEW YORK, Sept. 15, 1925

Consumers showed little interest in the market ten days ago, being confident that considerably lower levels would be in effect before long. Their stocks, it was understood, were ample to take care of current requirements, and with the months of October and November unsettled, as far as production is concerned, no quantity buying was anticipated. Manufacturers were reported as still working to capacity on old orders but without any new business in sight, it was believed that most factories will be caught up in a short time.

The market showed some improvement on the 9th when during the final hour buyers made their appearance. It was reported that arrivals were small and had not helped the situation to any great extent. It was believed that reduction in production would not average greater than 20 per cent below the August production. Rapid advances were made on the next day, although buyers did not respond because the advances were too sharp and too quickly made. A fair amount of business was done, however. The firm and advancing market was attributed to the lack of actual rubber, for the bulk of the demand was for immediate shipment. Activity continued on the 12th and there was active bidding for spot and September. Prices on spot shot forward sharply, lending color to the belief that some interests were badly in need of first half September goods. There were practically no sellers.

This week opened firm with prices showing further advances over the close of the previous Saturday. A fair amount of business was done, mostly for the account of dealers, with consumers, although bidding, showing little tendency to make committments at current prices. It was reported that two steamships originally planned for arrival this month would not arrive until late in October, which would bring arrivals in September much lower than earlier expectations. There seemed to be still need for nearby rubber but it was not being bought unless prices were fairly reasonable. No frantic bidding for September was in evidence, although there is some indication of a squeeze later in the month.

NEW YORK MARKET

Plantations—			
Ribbed Smoked Sheets			
Spot	.94	@	—
September	.92	@	—
October	.82½	@	—
November	.77½	@	—
Oct.-Dec.	.79	@	—
First Latex, crepe spot	.96	@	—
Amber Crepe, No. 2, spot	.84	@	—
" " No. 3,	.82	@	—
" " No. 4,	.77	@	—
Brown Crepe, Rolled	.60	@	—
" " Clean, thin	.83	@	—
" " Specky	.79	@	—
Pontianac—			
Bangermassin	Nominal		
Palembang	Nominal		
Prime Pressed	Nominal		
Sarawak	Nominal		
Paras—			
Up-river Fine	.60	@	—
" Medium	.53	@	—
" Coarse	.50	@	—
Islands, Fine	.57	@	—
Acre Bolivian, fine	.70	@	—
Tapajos, fine	Nominal		
Cut Beni Bolivian, fine	Nominal		
Caucho Ball—			
Upper, shipment	.49	@	—
Centrals—			
Corinto, scrap	.52	@	—
Esmeraldo, sausage	.45	@	—
Guayule, w and d	.48	@	—
Africans—			
Benguela, No. 2	Nominal		
Congo, upper, black	Nominal		
" " red	Nominal		
Kassai, Prime Red	Nominal		
Balata—			
Block, Columbia	.51	@	—
" Cuidad	.61	@	—
Surinam, sheet	.61	@	—
Gutta Percha—			
Siak	.23	@	—
Red Macassar	2.80	@	3.00
Chicle—			
Mexican, Yucatan	.68	@	—

LONDON MARKET

Standard Ribbed Smoked Sheets—	
Spot	42½d
October	38
Oct.-December	38¼
Jan.-March	33¼

SINGAPORE MARKET

Standard Ribbed Smoked Sheets—	
Spot	35⅞d
October	34½
Oct.-December	33⅛
Jan.-March	30¼

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Enameling Duck Drill Sheeting

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For cutting all rubber, composition and plain or impregnated fabrics.
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All grades for the rubber manufacturer.
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5 William St., Belleville, N. J.

THERMOMETERS—Recording, controlling temperature and pressure controllers.
American Schaeffer & Budenberg Corp.
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The Akron Rubber Mold & Machine Co.
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ZINC OXIDES — Including KADOX and "Albalith."
The New Jersey Zinc Sales Company
New York Pittsburgh Chicago
Cleveland San Francisco

CHEMICALS & COMPOUNDING INGREDIENTS

Accelerators — Colors — M.R. — Compounding Ingredients Softeners — Vulcanizing Ingredients — Rubber Substitutes

NEW YORK, September 15, 1925—The volume of trading in the market for industrial chemicals and compounding ingredients continues good. But heavy supplies caused declines in one or two instances. Contract withdrawals have been excellently maintained and during the past two weeks deliveries have shown increases. It was not expected that consumers would extend purchases at this time of the year. But manufacturers of chemicals have little to grumble about this year inasmuch as production curtailment at many of the rubber factories has been so long delayed and it is expected that a number of smaller factories will continue at peak production far into the winter.

ACCELERATORS

Organic			
Aldehyde ammonia, crystals	lb.	$ .90	@ .93
Aniline oil, drums	lb.	.17	@ .17½
Di-Ortho-Tolylguanidine	lb.	1.10	@ 1.13
Diphenylguanidine	lb.	.95	@ .98
Ethylidene aniline	lb.	.60	@ .65
Excellerex	lb.	.28	@ .34
Formaldehyde-Aniline	lb.	.40	@ .42½
Hexamethylene-tetramine	lb.	.80	@ .82½
Paraphenylenediamine	lb.	1.25	@ 1.30
Piperidine-Piperidyldithio-Carbamate	lb.	4.80	@ 5.00
Super-Sulphur No. 1	lb.	.50	@ .55
Super-Sulphur No. 2	lb.	.18	@ .30
Tensilac, No. 41	lb.	.65	@ —
Tuads	lb.	4.50	@ 5.00
Thiocarbanilide, kegs	lb.	.25	@ .32
Triphenylguanidine	lb.	.70	@ .75
Vulcone	lb.	.75	@ .79
Zimate	lb.	5.00	@ —
Inorganic			
Lead, sublimed blue	lb.	.10	@ —
Lead, white	lb.	.10¾	@ —
Litharge, domestic	lb.	.11½	@ —
Lime, superfine	lb.	.01½	@ .02
Magnesia, calcined, light	lb.	.24	@ .25
extra light	lb.	.40	@ .45
heavy	lb.	.04	@ .06½

COLORS

Blacks			
Arrow "Aerfloted"	lb.	.07½	@ .12
Bone Black	lb.	.05½	@ .11
Carbon "	lb.	.08	@ .12
Drop "	lb.	.07½	@ .14
Ivory "	lb.	.12	@ .45
Lamp "	lb.	.12	@ .40
Micronex	lb.	.09	@ .13
Thermatomic carbon	lb.	.04	@ .08
Blues			
Cobalt	lb.	.21	@ .26
Prussian	lb.	.34	@ .35
Ultramarine	lb.	.08	@ .35
Browns			
Iron oxide	lb.	.02¼	@ .06¼
Sienna, Italian	lb.	.04	@ .14
Umber, Turkey	lb.	.04	@ .06
Vandyke, domestic	lb.	.03	@ .03½
Greens			
Chrome, light	lb.	.28	@ .30
medium	lb.	.30	@ .32
dark	lb.	.31	@ .34
commercial	lb.	.09	@ .10
Chromium Oxide, bbl.	lb.	.37	@ .39
Reds			
Antimony crimson, 15/17 F.S.	lb.	.43	@ .45
sulphur free	lb.	.46	@ .49
golden, 15/17 F.S.	lb.	.17	@ —
pentasulphide, pure,	lb.	.35	@ .38
15/17 F.S.	lb.	.33	@ .36
red sulph. 15-17F.S.	lb.	.16	@ .20
Indian English	lb.	.11	@ .15
Oximony	lb.	.13½	@ —
Para toner	lb.	.90	@ 1.00
commercial	lb.	.13½	@ .14½
Red oxide, reduced	lb.	.04	@ .12
pure	lb.	.12	@ .14
Toluidine toner	lb.	1.85	@ 2.10
Venetian red	lb.	.01½	@ .05
Vermillion, quicksilver, English	lb.	1.35	@ 1.40
domestic	lb.	.15	@ .25
Whites			
Albalith	lb.	.05⅞	@ .06½
Aluminum bronze		—	@ —
Lithopone, Akeolith	lb.	.06	@ .06½
Lithopone, Azolith	lb.	.05⅝	@ .06½
Zinc Oxide—American Process XX red	lb.	.07½	@ .07¾
Kadox, black label, kegs	lb.	.10⅝	@ .11¼
blue " "		.09⅝	@ .10⅛
red " " "		.08⅝	@ .09⅛
American Azo: ZZZ (lead free)	lb.	.07¼	@ .07¾
ZZ (under 5% leaded)	lb.	.07	@ .07½
Z (8-10% leaded)	lb.	.06¾	@ .07¼
Zinc Oxide—French Process White seal	lb.	.12	@ .12¼
Green seal	lb.	.10¾	@ .11¼
Red seal	lb.	.09¾	@ .10¼
Yellows			
Chrome, light		.17½	@ .18½
dark and medium	lb.	.17½	@ .18½
Cadmium Sulphide	lb.	1.20	@ 1.50
Ocher, French medium	lb.	.02½	@ .02⅝
domestic	lb.	.01½	@ .02½

COMPOUNDING INGREDIENTS

Aluminum Flake (f.o.b. plant)	ton	21.85	@24.50
hydrate light	lb.	.16½	@ .17½
Ammonia carbonate	lb.	.12	@ .13½
Asbestine	ton	18.00	@20.00
Barium carbonate	ton	54.00	@56.00
Barium Dust	lb.	.05	@ .06
Barytes southern off-color	ton	12.00	@18.00
Western prime white	ton	22.00	@23.00
imported	ton	27.00	@35.00
Basofor	lb.	.04½	@ —
Blanc fixe, dry f.o.b. works	lb.	.04	@ .04¼
Carrara filler	lb.	.01¾	@ .02
Chalk, precip., extra light	lb.	.04¼	@ .05
heavy	lb.	.03¼	@ .04
Clay, China, domestic	ton	15.00	@25.00
Catalpo (fact.)	ton	35.00	@38.00
Dixie	ton	20.00	@35.00
Blue Ridge, Dark	ton	9.00	@ —
" " Light	ton	12.00	@ —
Langford	ton	12.00	@22.00
Glues, extra white	lb.	.21	@ .29
medium white	lb.	.18	@ .24
common bone	lb.	.11	@ .14
Graphite flake, bbls.	lb.	.06½	@ .12
Infusorial earth, powdered	ton	23.00	@25.00
bolted	ton	15.00	@20.00
Liquid latex	gal.	3.00	@ —
Magnesia, carbonate	lb.	.08¼	@ .09
Mica, powdered	ton	65.00	@80.00
Rotten Stone (powdered)	lb.	.02½	@ .04½
Soapstone, powdered	ton	15.00	@22.00
Starch, powdered	cwt.	3.81	@ —
Talc, domestic	ton	16.00	@18.00
Terra Alba	cwt.	1.25	@ 2.00
Tripoli, white	lb.	.02	@ .02½
Whiting, commercial	cwt.	1.00	@ 1.15
gilder's bolted	cwt.	1.25	@ 1.35
English cliffstone	cwt.	1.50	@ —
Paris white American	cwt.	1.25	@ 1.50
Quaker	ton	13.00	@15.00
Sussex	ton	8.00	@10.00
Wood pulp XXX	ton	35.00	@ —
" " X	ton	25.00	@ —

MINERAL RUBBER

Gehasco (factory)	ton	50.00	@52.00
Granulated M.R.	ton	36.00	@45.00
Hydrocarbon, Hard	ton	29.00	@35.00
Hydrocarbon, Soft	ton	29.00	@35.00
320/340 M.P. hydrocarbon (c. l. factory)	ton	47.00	@52.00
300/310 M.P. hydrocarbon (c. l. factory)	ton	42.00	@47.00
Paradura	ton	70.00	@75.00
Robertson, MR, solid	ton	25.00	@37.00
M.R. (gran)	ton	42.00	@80.00

SOFTENERS

Acids			
Acetic, 28%	cwt.	3.00	@ 3.25
Cresylic, 97%	gal.	.59	@ .62
95%		.57	@ .60
Muriatic, 20%	cwt.	.90	@ 1.00
Nitric, 36 degrees	cwt.	4.50	@ 4.75
Sulphuric, 60 degrees	ton	10.00	@11.00
66 degrees	ton	14.00	@15.00
Tartaric, crystals	lb.	.29	@ —
Alkalies			
Caustic soda, 76%	cwt.	3.20	@ —
Soda ash, 58% C.L.	cwt.	1.43	@ 1.45½
Oils			
Castor, No. 3, bbls.	lb.	.15½	@ —
Corn, crude, bbls.	lb.	.13	@ —
refined	lb.	.14	@ —
Cottonseed, crude		.09½	@ —
Glycerine C.P. drums	lb.	.19	@ .19½
Linseed, Raw C.L. bbl.	gal.	.99	@ —
Palm, Niger	lb.	.08⅞	@ .09
Lagos	lb.	.09	@ —
Peanut, domestic, crude	lb.	.13	@ —
Petrolatum, white		.10¾	@ .11
amber		.03⅝	@ .03⅞
dark amber	lb.	.03⅜	@ .03½
Pine, steam distilled	lb.	.65	@ .66
Rapeseed, refined	gal.	1.02	@ 1.03
blown	gal.	1.05	@ —
Rosin, first rectified	gal.	.63	@ .64
second rectified	gal.	.66	@ .67
Soya Bean, crude		.13¼	@ .13½
Tar, commercial	gal.	.30	@ .32
Resins and Pitches			
Parra M.R.	lb.	.06	@ .07
Tar Retort	bbl.	14.50	@15.00
kiln burned	bbl.	14.50	@15.00
Pitch, Burgundy	lb.	.06	@ .06½
coal tar	gal.	.05½	@ .06
pine	bbl.	6.00	@ 6.50
Rosin, grade K	bbl.	13.60	@ —
Solvents			
Alcohol, denatured, No. 1 bbls.	gal.	.60½	@ .64¼
Benzol, 90%	gal.	.28	@ .30
pure		.32	@ —
Carbon bisulphide	lb.	.06½	@ .07½
tetrachloride	gal.	.07	@ .08
Dimethylanliline	lb.	.32	@ .34
Motor gasoline, steel bbls.	gal.	.17	@ —
Naptha, V. M. & P.	gal.	.16¾	@ —
Toluene	gal.	.26	@ —
Turpentine, spirits	gal.	1.14½	@ 1.16
wood	gal.	.95	@ .96
Waxes			
Beeswax	lb.	.55	@ .65
Carnauba, No. 1	lb.	.37	@ .38
Ceresin, white	lb.	.10	@ .11
Montan, crude	lb.	.06	@ .06½
Ozokerite, black	lb.	.24	@ .25
green	lb.	.26	@ .30
Paraffine White, A.M.P.	lb.	.05¾	@ .05½
Yellow A.M.P.	lb.	.05¼	@ .05⅝
Sweet wax	lb.	.12	@ —

SUBSTITUTES

Black	lb.	.08½	@ .15
White	lb.	.10½	@ .17½
Brown	lb.	.10	@ .16
Brown factice	lb.	.10	@ .16
White factice	lb.	.10½	@ .17½

VULCANIZING INGREDIENTS

Black hyposulphite	lb.	.18	@ .20
Ethyl Chloride, Cyl.	lb.	.55	@ —
" " Drums	lb.	.45	@ —
Sulphur Chloride (drums)	lb.	.04½	@ .05
Sulphur flour			
Commercial bags	cwt.	1.35	@ 1.70
" bbls.	cwt.	1.70	@ —
Superfine, bags	cwt.	2.00	@ 2.40
" bbls.	cwt.	2.40	@ 2.70
100% pure, refined, bags	cwt.	2.30	@ 3.00
bbls.	cwt.	2.50	@ 3.40

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This Weeks News

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EDITOR'S REVIEW DESK

Books **Trade Catalogs** **Articles**

PAST, PRESENT AND FUTURE. Published in *The Rubber Quarterly*, Aug. 1, 1925.

Restriction, now in its eleventh quarter, is discussed in this article in relation to the price rise of spot rubber. The immediate effect of this event was to cause consumers to leave the markets to the tactics of gamblers, the outside public to buy rubber shares heavily and those interests likely to feel the ill effects of such a rise to criticize the Stevenson scheme. Rubber growers have hailed the continued high price and profits as an inevitable result of restriction.

All estates were not equally fortunate. Some sold a large proportion of their future output at prices ensuring only a moderate margin of profit and though market quotations for "distant positions" have recently risen considerably, the real boom has virtually been confined to comparatively small quantities of rubber for near delivery.

The author of this article views all attacks on the Stevenson Scheme at this late date as somewhat unnecessary "seeing that in a very short time restriction will have a purely historic interest." Future historians of the rubber trade, this writer feels, will be the only ones qualified to discuss intelligently this much-discussed measure.

MANAGEMENT METHODS, No. 4. A New Method of Balance Sheet Analysis. Issued by the Policyholders' Service Bureau, Metropolitan Life Insurance Company, New York City.

The ratio of current assets to current liabilities has been used as the basis of analyzation of balance sheets heretofore, but the method developed by a group of financial men and explained in this booklet places its reliance for facts upon a different course. By including sales with the regular items, it is possible to determine the following ratios most helpful in any analysis, particularly a credit one; the usual ratio of current assets to current liabilities; merchandise to receivables; net worth to non-current liabilities; sales to receivables; sales to merchandise; sales to net worth; worth to total debt; sales to fixed assets.

* * *

UNITED STATES GOVERNMENT MASTER SPECIFICATION FOR RUBBER GOODS (Methods of Physical Tests and Chemical Analyses). Issued by the Department of Commerce, Bureau of Standards.

This circular covers the usual requirements which the Government holds necessary for the purchase of rubber goods by departments. Methods of physical tests and chemical analysis are explained in detail and a separate section is devoted to analysis of packings.

Accelerators and Their Use

(*Continued from Page* 410)

carbamates, zinc oxide and sulphur. The products that are formed by the reactions that take place between these substances should possess accelerating powers.

Reactions of Hexamethylenetetramine

Hexamethylenetetramine (128), when heated with sulphur, ammonia, carbon disulphide and sulphuretted hydrogen, yields methyldiphenylamine. When heated alone it loses aniline. Methylene groups in compounds such as piperidine and pentamethylenediamine should split off ammonia. In the reactions which take place between carbon disulphide and ammonia or basic amino compounds, dithiocarbamates are formed in accordance with the investigations made by Bedford and Scott (129).

As has been mentioned above, these belong to the group of carbo-sulphi-hydryl-polysulphide accelerators. The action of this class of accelerators is by the formation of metallic salts which contain sufficient proportion of per-sulphur to effect the vulcanization of the rubber (130 and 131).

According to Bruni and Romani the thiocarbamate accelerators, when mixed with zinc oxide, yield the corresponding zinc salts which are then decomposed by means of sulphur to give the thiouram sulphides. The latter compounds then split off sulphur (132). According to Thomas, accelerators which contain nitrogen form thiocyanic acids. Hence these substances also fix the di-valent sulphur which is thus set free in the penta-valent form and then when they decompose in the rubber mixture yield active sulphur. The action of the nitroso compounds must therefore rest on the formation of sulphuretted hydrogen and sulphurous acid gas.

In general, as far as the action of the accelerators is concerned, the view is held that these substances must first be converted into the form of polysulphides before their accelerating activity can be manifested (134). Iterson made certain investigations on this matter and found that vulcacite and accelerene, that all bases (ammonia particularly), carbonic acid and sulphuretted hydrogen are positive catalyzers for institution of the equilibrium $S_{lambda} \rightleftarrows S_{mu}$.

These substances are known as accelerators of vulcanization. Hence it is not absolutely necessary to assume that in all substances the formation of sulphurized intermediate products is essential, but the assumption may often be made that all that is necessary is the institution of the equilibrium $S_{lambda} \rightleftarrows S_{mu}$, which is affected catalytically and in a different manner by the most differently constituted compounds.

In addition to the action of the accelerators on the sulphur, it must also be assumed that such an action takes place on the rubber gum as well, and this has been established (135). It is known that the viscosity of a solution of rubber is increased by zinc oxide (Bysow) and by magnesium oxide as well (136). On the other hand other investigators have noticed a reduction in the viscosity of rubber solutions as a result of the addition of the accelerators to the rubber mixture before vulcanization (137).

In order to obtain a clear idea of the mechanism of the various processes that are involved in this matter, attention must be paid to the preliminary handling of the rubber and consideration given to the nature of the solvent above all other matters. The action of the accelerator will then appear in the proper light, when further progress is made into the chemistry of the vulcanization of rubber.

128. Bedford and Scott, see reference cited above.
129. *Gummi Zeitung*, 24, March 12, 1920, 34, page 498.
130. Bedford and Scott, *Gummi Zeitung*, 23-4, March 16, 1923, page 371.
131. Bedford and Sebrell, see reference cited above.
132. *Gummi Zeitung*, 7-8, Nov. 23, 1923, 38, page 111-2.
133. Thomas, see reference cited above.
134. Behncke, *Gummi Zeitung*, 37, June 10, 1921, 35, page 898.
135. Thomas, see reference cited above.
136. Feuchter, *Gummi Zeitung*, 48, 38, page 796-8.
137. Le Blanc and Groeger, *Journal of the Society of Chemical Industry*, 1921, page 667; *Gummi Zeitung*, 19, Feb. 10, 1922, 36, page 531.